Journal of Health Services Research & Policy
18(Suppl. 3) 1–12

DOI: 10.1177/1355819613502011
jhsrp.rsmjournals.com

Health research, development and innovation in England from 1988 to 2013: from research production to knowledge mobilization

Kieran Walshe[1] and Huw TO Davies[2]

Abstract

This paper presents a critical analysis of the development of government policy and practice on health research, development and innovation over the last 25 years – starting from the publication of a seminal report from the House of Lords Science and Technology Committee in 1988. We first set out to map and analyse the trends in ideas and thinking that have shaped research policy and practice over this period, and to put the development of health research, development and innovation in the wider context of health system reforms and changes. We argue that though this has been a transformative period for health research, rather less progress has been made in the domains of development and innovation, and we offer an analysis of why this might be the case. Drawing on advances in our understanding about how research informs practice, we then make the case for a more integrative model of research, development and innovation. This leads us to conclude that recent experiments with Collaborations for Leadership in Applied Health Research and Care and Academic Health Science Centres and Networks offer some important lessons for future policy directions.

Keywords
innovation, knowledge mobilisation, research policy

Introduction

Health research is big business in the United Kingdom. Total spending amounts to about £8 billion a year, which is about a third of all funding for research and development in the UK according to the Office for National Statistics.[1] Over half (£4.5 billion) comes from industry and is mostly invested in research on pharmaceuticals, medical devices and diagnostics. Medical research charities spend about £1.2 billion a year, again mostly on biomedical research. The government provides the rest – about £2.3 billion pa – through universities, research councils and the NHS, funding a combination of basic science, clinical and health services research.[2] But the scale of this investment raises some difficult and enduring questions about how and how well it is used, what impacts it produces and whether it represents good value for money.[3]

Purpose and method

This paper presents a critical analysis of the development of government policy and practice on health research, development and innovation over the last 25 years – starting from the publication of a seminal report from the House of Lords Science and Technology Committee in 1988. We focus primarily on England because, since devolution partway through our period of analysis in 1999, policies and structures in the four countries of the UK have diverged somewhat[4] and our main purpose in this paper is not to develop a comparative analysis across the UK but to examine how and why policy and practice have changed over time. Our approach to this review was framed by the idea of 'policy-as-discourse'[5] which emphasizes the importance of social and political context, language

---

[1] Professor of Health Policy & Management, Manchester Business School, The University of Manchester, UK
[2] Professor of Health Care Policy and Management, School of Management, University of St Andrews, UK

Corresponding author:
Kieran Walshe, Manchester Business School, The University of Manchester, Booth St West, Manchester M15 6PB, UK.
Email: kieran.walshe@mbs.ac.uk

and debate, organizational and institutional power, and ideology in the policy process, and challenges conventional rationalist and technocratic approaches to policy analysis which often leave fundamental issues unquestioned or unspoken.[6] Our main sources are documentary – we reviewed government reports and other publications (principal examples of which are listed in Table 1) and the small but growing journal literature on health research policy. But we should note that having been involved ourselves as actors in the health research and policy domains over this period, our own lived experience undoubtedly contributes to our analysis and conclusions.

We first set out to map and analyse the trends in ideas and thinking that have shaped research policy and practice over this period, and to put the development of health research, development and innovation in the wider context of health system reforms and changes. We argue that though this has been a transformative period for health research, rather less progress has been made in the domains of development and innovation, and we offer an analysis of why this might be the case. Drawing on advances in our understanding about how research informs practice, we then make the case for a more integrative model of research, development and innovation. This leads us to conclude that recent experiments with Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) and Academic Health Science Centres and Networks (AHSCs and AHSNs) offer some important lessons for future policy directions.

Priorities in medical research: a longstanding concern

In 1988, a report from the House of Lords Science and Technology Select Committee[7] was caustic in its criticism of the disconnection between health research and health care delivery in the United Kingdom. It concluded that the government 'considers that medical research does not matter' and 'gives the impression, right or wrong, that neither the NHS or the DHSS demonstrates any awareness of the importance of research nor is prepared to devote time, effort and resource to promote it'. It made two principal recommendations. First, that the NHS 'should be brought into the mainstream of medical research, and should articulate its research needs; should assist in meeting those needs; and should ensure that the fruits of research are systematically transferred into service'. Second, that 'a National Health Research Authority should be created' to fund applied health research, alongside and complementary to the Medical Research Council which should continue to fund basic science research. These were not new concerns, nor were these recommendations necessarily wholly novel. For example, in 1971, a committee chaired by Lord Rothschild had reached similar conclusions in relation to government-funded research and development more generally,[8] and throughout the 1980s, commentators had highlighted the neglect and consequent decline of health research funding, training and infrastructure.[9] But the House of Lords Select Committee report was a turning point. The government accepted its findings fully, and the report received remarkably positive responses from important stakeholders in health research in the NHS, universities and the scientific community.[10] Rather than establishing a new National Health Research Authority, the government chose to create a Directorate for Research and Development in the NHS and the Department of Health, and the first director, Michael Peckham, took up post in 1991. The first ever NHS research strategy titled *Research for health* was published within a few months, and it set out an ambitious agenda for change.[11] It argued that the NHS should spend about 1.5% of its annual budget on research (at the time it was spending about half that), advocated for applied research on the effectiveness of health care interventions and services, made the case for a knowledge-based health service and called for the establishment of a regionally led health research infrastructure in the NHS.

Policy on research and development: reform, investment and more reform

Since those key changes in 1988–1991, there has been a steady and unremitting flow of government and parliamentary reports on health research, a progressive process of organizational and structural change, and a substantial growth in, and some redistribution of, research spending. Table 1 lists selectively 13 reports relevant to health research, development and innovation produced over the last 25 years by the Department of Health, other government departments, Parliamentary bodies, the National Audit Office and other stakeholders. One obvious conclusion is that health research has remained a sustained concern for the policy community and the NHS.

Making sense of this welter of written evidence and discerning the underlying policy discourse is not straightforward,[12] but our reading of the documentary material and its analysis by others[3,12] suggests that there are some important themes in the policy discourse that can be highlighted. We discuss five key themes below: research infrastructure; funding for research; the role and contribution of the research community; research and health care strategy-making; and research, innovation and impact.

Table 1. A brief summary of major reports on health research and development since 1988.

1988	House of Lords Science and Technology Select Committee publishes ‘Priorities in medical research’ criticizing lack of DHSS and NHS attention to research and calling for NHS research investment and National Health Research Authority.
1991	First ever director of research and development for the NHS and DH appointed and ‘Research for health – a research and development strategy for the NHS’ published by Department of Health, recommending NHS spends 1.5% of budget on R&D, advocating a knowledge based health service and setting out plans for research infrastructure.
1994	Culyer report ‘Research and development task force: supporting research and development in the NHS’ recommends funding reforms for NHS R&D – separating research and health care delivery funding, and controlling and allocating research funding centrally.
1995	House of Lords second report titled ‘Medical research and the NHS reforms’ revisits reforms and highlights need to build infrastructure, capacity and career structures for researchers.
1999	New government publishes ‘Research and development for a first class service’ which announces further funding reforms to split research funding into support for science and NHS priorities and needs funding.
2001	Department of Health produces ‘Science and innovation strategy’ which summarizes research policy and sets out goals including new research areas, better knowledge management and changes to research governance.
2004	National Audit Office report on ‘Getting the evidence’ which highlights need for better strategic direction of government research and more proactive and innovative dissemination and research utilization.
2004	Department of Health publishes ‘Research for patient benefit working party final report’ which proposes founding UK Clinical Research Collaboration to coordinate health research and clinical research networks.
2006	DH publishes ‘Best research for best health’ strategy setting out five-year strategy including establishing National Institute for Health Research, expanding funding programmes and research centres, investing in faculty/research staff, and further reforms to how funding is allocated.
2006	HM Treasury publishes ‘A review of UK health research funding’ led by Sir David Cooksey. Recommends better coordination of MRC and NIHR and separation of NIHR from Department of Health. Highlights first and second ‘translational gaps’ in research process, and economic/wealth dimension of health research.
2007	Department of Health publishes ‘High quality care for all’ by Sir Ara Darzi which highlights patchy and slow innovation, introduces statutory duty of innovation and investments in innovation, and proposes new Academic Health Science Centres – partnerships of universities and the NHS.
2011	Academy of Medical Sciences produces ‘A new pathway for the regulation and governance of health research’ which notes the complex and fragmented structures for health research in the NHS, and variable engagement in research among NHS organisations. Leads to creation of new Health Research Authority.
2011	NHS chief executive publishes Carruthers report ‘Innovation, health and wealth: accelerating adoption and diffusion in the NHS’ which emphasizes ‘health and wealth’ agenda, critiques slow pace of innovation, and sets out eight themes including development of Academic Health Science Networks, better incentives for innovation and focus on ‘high impact’ innovations.

The drive for research infrastructure

Over the whole period, the dominant policy concern has been to create and sustain an infrastructure for doing research in, and with, the NHS. As a result, much policy attention has been given to the complex business of allocating research funding to research providers and NHS organisations hosting research studies and to securing value for money and protecting or ring-fencing research funds. There has been continuing concern to ensure that components of that infrastructure – such as researchers, clinical research facilities, research management support and the like – should be in place and a series of capacity building initiatives have resulted. Indeed, since its establishment in 2006, the National Institute for Health Research (NIHR) has invested twice as much in areas of research infrastructure such as creating an NIHR faculty, clinical research networks and centres for biomedical and applied health services research as it does in directly funding research projects.[13]

There is no doubt that the organizational infrastructure for health research in the NHS has been transformed over this period and is now is much more developed, distributed and accountable than was the case in 1988. In the NHS, the disentangling of health service and health research funding and costs which was started by the Culyer report[14] in 1994 has since become ever more exacting and sophisticated. NHS organisations involved in research have needed to create their own local infrastructure for managing research finances, costing projects and correctly allocating research and service support costs. The increased availability of research funding through various forms of bidding or application process and the investment by NIHR in local and national research networks and in research infrastructure to support both NIHR-funded and charity and industry-funded research in the NHS stimulated the expansion of local research and development (R&D) departments to provide research management facilities and to develop local NHS research strategies and plans.[15] The increased rigour of requirements for overseeing research ethics and governance has also driven NHS organisations to put formal local arrangements in place. The consequence is that now every NHS organisation has some local research and development function, and larger and more research-active NHS organisations usually have a substantial R&D directorate, with executive team or board level representation by a director of R&D, and staff involved in research support, finance, governance and capacity development. But the sustainability of this infrastructure is perhaps open to question: it is largely reliant on external funding from NIHR and elsewhere, and it serves a research agenda that is mostly external to the local organization. Thus, local research infrastructure is not paid for locally and does not usually serve local organizational knowledge needs; so it is part of, but perhaps not fully embedded in, host NHS organisations.

Funding for health research

There is also no doubt that funding for health research has grown very substantially over this period, and the way funds are allocated and used has changed too. In 1988, at the time of the House of Lords Select Committee report, it was estimated that total health research spending amounted to £1.5 billion a year, with the two main government funding streams – the Medical Research Council and the pre-NIHR Department of Health research budget – amounting to £200 million and £225 million, respectively.[16] By 2009/2010, overall health research spending was about £8 billion; the MRC budget was £656 million, and the NIHR budget was £921 million.[2] These represent real terms increases over this period of 167%, 64% and 105%, respectively. Accounting for and measuring the changes in spending by government, charities and the private sector is not straightforward, but there is no doubt that research spending has grown very markedly.

In addition, the distribution of funding has shifted somewhat towards more applied research. Even though most government and charitable health research spending (60%) is invested in basic science research on biological mechanisms and the aetiology of disease, 19% is now spent on developing and evaluating treatments and 7.5% is spent on health services research.[2] Most of that money goes to universities, and although a growing share is received by NHS organisations, it is difficult to quantify that division since grants are often shared across NHS and academic institutions.

Importantly, the way that Department of Health and NHS research funds are allocated has changed markedly. At the start of this period, funds were allocated in block grants to NHS organisations as part of a service increment for teaching and research (SIFTR) with little or no accountability for how they were used, and some evidence that they were used to subsidize service delivery or to do poor quality small-scale research.[10] Through the Culyer report and subsequent reforms, research spending was separately identified, quantified and brought into the central NIHR budget to be allocated via grants, competitive bidding rounds and networks to the NHS against much more tightly controlled criteria and with clear accountability for research performance. This has made the costs of research more explicit and has enabled NIHR to back up its strategic plans with substantial resource investments in priority areas. But it has also contractualized research activity and may have encouraged NHS organisations to view research as an income stream alongside others rather than as an activity which serves their own needs for knowledge and in which they should themselves be investing. It may have strengthened the economic case for health research and development, which argues that investments in research result in economic gains for the wider economy[17] – what has been called the 'health and wealth' agenda. However, this approach also tends to favour particular kinds of research, which produce patentable products and protectable intellectual property (such as drugs and devices), over others which do not (such as service redesigns and new models of care, or training interventions).

Setting research policy and strategy

It is important to consider who has made and shaped policy on health research, development and innovation over this period. Whether you examine the makeup of boards of key institutions and committees, the authorship of important reports such as those listed in Table 1, or the relative influence of NHS organisations, universities, research councils and others, it seems self-evident that the research community itself has been largely left in charge of research policy. From the outset, the individual and collective voices of research funders and producers (in both the public and private sector) have been much more influential than those of the research user community – health care organizations, clinicians, patients and the public. It is perhaps inevitable that the research community has the most concentrated interest in the research agenda and so is likely to mobilize to support and protect that interest.

From Michael Peckham's first research and development strategy for the NHS onwards,[11] policy documents have consistently emphasized that research exists to serve the needs of the NHS and have given some support to Peckham's vision of a 'knowledge based health service'. But in practice, it seems that the concerns of research producers – infrastructure, capacity, access to patients and facilities for research – have predominated. This is further illustrated in our discussion of our final two themes below – the strategic purpose of research and the place of development and innovation.

But it is simplistic to talk of the 'research community' as if it is a homogeneous and collective entity, when in fact it includes such diverse interests as universities, medical research charities, pharmaceutical companies and the most research-intensive NHS organisations, and a variety of disciplines ranging from the life sciences and biomedicine, through more clinically focused areas such as nursing, psychology and medical education, to the social science disciplines such as sociology, economics and public policy. In that community, by far the most influential voices have been those of interests in industry, life sciences and biomedicine who have led what Shaw and Greenhalgh describe as the 'scientific colonization' of health research.[12] As the earlier discussion of research funding illustrated, government spending has long been largely concentrated on what is sometimes described as basic or underpinning science – biological and chemical mechanisms and the aetiology of disease – with much less investment in the development and evaluation of treatments, though the latter area is of course where the private sector invests heavily. Although the need for investment in research to serve the wider health services research needs of the NHS, beyond biological science and technology evaluation, was first highlighted by the House of Lords report in 1988 and has since been restated elsewhere,[18] it is clear that health services research – covering areas such as public health, disease prevention, health economics, service delivery, the workforce and so on – has been and remains relatively peripheral at least in funding terms (7.5% of government funding or about 2% of total spending on health research).

The rapid growth of health research over this period leads inevitably to questions about its strategic purpose and its value for money. In fact, for much of this time when overall health care spending in England was rising comfortably in real terms, the economic and business case for health research investment was largely taken for granted. However, in the current age of austerity with virtually no real-terms increase in health care funding for perhaps a decade[19] and growing cost pressures resulting from increasing demand for health services, it is increasingly necessary to be able to demonstrate that health research serves the central strategic purposes of the wider NHS. It has already been noted that, perhaps understandably, research strategy has been mostly concerned with the business of doing research rather than with what that research is for, what or whose purposes it is meant to serve or how it contributes to the wider strategic aims of the NHS in England. In the NIHR research strategy launched in 2006 and still in force, *Best Research for Best Health*,[20] four of the five strategic goals relate primarily to the research process – establishing the NHS as an internationally recognized centre of research excellence, building research capacity, improving research management and governance and ensuring good value for money. One strategic goal was about the purpose of research – to commission research focused on improving health and care – and the document set out how through commissioned programmes, projects, units and centres, NIHR aimed to identify and then meet NHS research needs. Indeed, it can be argued that the NIHR health technology assessment programme has been an international exemplar of needs-led, science-added commissioning in which important and NHS-relevant research questions to do with health technologies like drugs and devices are systematically identified, prioritized and then research is commissioned to meet those needs.[21]

What seems absent, however, is a strong sense of a wider connection to the strategic direction and needs of the NHS as a whole – which have changed radically over the last 25 years. One key example perhaps demonstrates this point most clearly. Since 2009, the NHS in England has been seeking to make year on year productivity improvements of about 4% in order to meet the growing demand for health care from within a static health care budget. The Quality, Innovation, Productivity and Prevention (QIPP) programme has been put in place with the ambitious target of finding productivity improvements of about £15–20 billion per year within four years.[22] One might expect that this predominant NHS concern with efficiency and productivity would have been incorporated into the NHS research strategy and have become the focus of substantial research commissioning intended to produce more efficient and productive health care delivery systems. But this is not the case. It seems that the research enterprise and community have shown little interest in the knowledge and research needs of QIPP. Rather, their concerns about the cost pressures on the NHS have tended to centre on the risks that they might lead to a reduction in research spending. Indeed, it can be argued that much current health research is more likely to be cost increasing than cost reducing – adding to rather than ameliorating cost pressures.[23]

Overall, it can appear that the research enterprise itself is the purpose of health research, and that the long-standing and oft-stated ambition that research strategy should more closely serve the needs of the NHS has not yet been fully achieved.

Innovation and impact

We turn finally in this analysis of key themes in research policy and practice to the contested issues of innovation and impact – how evidence from research is used, disseminated, understood, translated, mobilized or applied, and what effects are seen on how health care systems work and how health care is delivered to patients. Over the period we are reviewing, this has moved from being something which was perhaps rather taken for granted and seen as necessary but unproblematic; to being a central policy concern and the subject of a number of initiatives aimed at increasing the pace, scale and consistency of innovation across the NHS. At the same time, our understanding of how knowledge is used and how innovation happens has advanced,[24] and it has become clear that some common implicit assumptions about the capacity of health care systems and organizations to mobilize knowledge and about the way that innovation processes work within organizations and communities of practice such as the health care professions were not well grounded either in theory or in empirical reality.[25,26]

It is our contention that research policy has always been more concerned with research production than with development or innovation, and that although the use of research was often mentioned in the documents summarized in Table 1, there was a tendency to presume that if the right research was produced, and made available to clinicians and health care organizations, it would be used. Even at the time, it was increasingly evident that this was not the case. In the early 1990s, the rise of the evidence-based health care movement challenged the traditions of professional practice and clinical freedom, and provided a growing evidence base from which to assert that research evidence was often not well used by clinicians. The overuse of ineffective interventions and underuse of effective interventions were shown to be serious and widespread problems.[27] Moreover, research on the way clinicians and managers used evidence in their practice and decision making made the case for a more sociologically informed approach to the issues, which saw knowledge mobilization and use as complex but tractable social and organizational problems requiring changes to organizations and processes, not just further exhortation.[28,29]

The Cooksey review of health research, commissioned by the Treasury and published in 2006, was in some ways a turning point in this debate because it highlighted the importance of knowledge translation.[18] It adopted a linear 'pipeline' model of research – from laboratory to bedside – and argued that in that pipeline there were two important translational gaps, where research uptake or transfer was slowed. The first gap concerned how ideas from basic and clinical research resulted in the development of new products and approaches to treatment of disease and illness; and the second gap concerned how those new products and approaches were implemented in clinical practice. But the report offered few if any specific recommendations for change to address this second translational gap, beyond proposing an accelerated pathway for drug development and licensing. Like earlier reports, most of its recommendations concerned improvements to research production.

In 2008, as part of a much wider review of the NHS, the Darzi report highlighted the slow and uneven pace of innovation in the NHS, and made a host of recommendations for change.[30] Importantly – and perhaps for the first time – it offered a conceptualization of innovation which was not research driven, saying that 'our researchers have made a great contribution and will continue to do so. However, too often innovation has been defined narrowly, focusing solely on research, when in fact innovation is a broader concept, encompassing clinical practice and service design. Service innovation means people at the frontline finding better ways of caring for patients – improving outcomes, experiences and safety. In this country, we have a proud record of invention, but we lag behind in systematic uptake even of our own inventions.' (p.55). It made a number of recommendations aimed at accelerating and institutionalizing innovation, one of which was that the Department of Health should establish a number of AHSCs – collaborations of universities and large, research-active NHS health care organisations with an integrated mission of research, education and service delivery. At the same time, NIHR announced that it would fund a number of CLAHRCs.[31] These too were to be collaborations of NHS organisations with universities, who jointly could demonstrate a substantial portfolio of applied health research and a track record of implementing research findings and improving patient outcomes.

In 2011, innovation was, for the first time, the central focus of a report for the Department of Health and the NHS. Led by Sir Ian Carruthers, the report *Innovation, health and wealth* again critiqued the slow and uneven processes of innovation in the NHS and set out an analysis of six key barriers to innovation and how they might be tackled.[32] But it also connected the need for innovation with the wider challenges to the health care system, particularly of productivity and resource constraint, and offered a somewhat more organizationally focused set of recommendations designed to improve innovation, diffusion and adoption. In particular, it proposed the creation of AHSNs, which were to build on the work of the handful of AHSCs and bring most or all NHS organisations into collaborative partnerships with universities. Crucially, the primary goal of AHSNs was to be 'to improve patient and population health outcomes by translating research into practice and developing and implementing integrated health care services. Working with AHSCs, they will identify high impact innovations and spread their use at pace and scale throughout their networks.' (p.19). In other words, and for the first time, the primary mission was presented as knowledge mobilization, rather than research production.

Summary: transformation and divergence

In summary, this has been a transformative period for health research in England, during which the sustained investment of policy attention and resources has led to a very substantial growth in research activity, capacity and infrastructure. But it is less clear that these changes have become embedded in the NHS in ways that make them sustainable, and indeed some separation and divergence between the research enterprise on the one hand and the health care delivery system on the other can be observed. Recent developments focused on supporting and accelerating innovation, diffusion and adoption can be seen in part as a response to this divergence and its consequences.

The wider context: health reform and its impact on health research, development and innovation

The changes in health research outlined above have taken place against a backdrop of successive reforms in health policy, and the wider NHS, under three governments – the Conservative administrations from 1988 to 1997, Labour administrations from 1997 to 2010 and the current coalition government from 2010 to 2013. Those reforms are well described elsewhere,[33] but it is important to highlight some major themes in the reforms which affect health research, development and innovation. In particular, we discuss the way the NHS has moved from being akin to a single very large organization to being more like a regulated industry of autonomous organizations; the way funding for health services and health research have been reformed to make allocations more transparent and create greater accountability for performance; the changes to the medical workforce and to clinical and research careers; and the changing nature of demand for health care. Each of these has major implications for how the research enterprise serves NHS knowledge needs.

Fragmentation: from one organization to many

The NHS has moved from being – and behaving– something like one organization in 1988, with a hierarchy of control and direction led by the Department of Health, to being a regulated industry with a plurality of health care providers both public and private in 2012. Public health care provision has been placed in the hands of increasingly autonomous NHS trusts (and latterly NHS foundation trusts) and a variety of primary care organizations. The extent of private –not-for-profit and for profit – provision of NHS care has steadily grown, and the use of competition and contestability among health care providers has markedly increased. The role of the Department of Health in managing health services centrally has reduced and new national regulatory agencies have been created to take its place.[34]

The removal of a long established and – for some – comfortable hierarchy of control and its replacement by a network of contractual and regulatory relationships has already created some immediate and practical challenges for health research. Health care providers – both traditional NHS ones and new for-profit and not-for-profit ones – cannot be presumed to be willing to support research, or to take on risks and responsibilities associated with research which do not serve their own local priorities and goals, and the business case for research engagement needs to be clear at a local organizational level. Securing organizational engagement in, and support for, research has become a protracted process, especially for large and multi-centre research studies. Researchers find themselves slowly and painfully negotiating a mosaic of interlocking and locally variable governance and funding structures especially when research crosses organizational and service boundaries.[35] But at a more fundamental level, these changes throw up basic questions about the purpose and value of research, the purpose and content of industry level, pan-NHS research strategies, the ownership of the research agenda by organizations themselves, the commercial value of research findings and the their use in securing competitive advantage in the marketplace, the willingness to share and disseminate knowledge across providers and so on.

Funding and costing mechanisms

The funding of NHS services has also been reformed, with the introduction of a separation of purchasing and provision from 1991, and with the increasing use of contractual mechanisms, competition, and latterly case-mix-based prospective payment systems in which funding is closely tied to service provision activity.[36] This has had the effect of making service costs and income much more transparent, and of driving out opportunities for implicit cross-subsidies and other forms of accommodation for unfunded costs in areas like research. We have already noted earlier the parallel reforms to health research funding, which similarly have made the costs of research explicit, have separated them from service delivery costs and have seen research funding allocated contractually for defined research activities and performance. The consequence of these changes is, in short, that research now has to be seen to pay its way within local health care organizations.

Clinicians' time spent on research, service costs associated with doing research and the service cost consequences of research are more closely monitored and the payback from such investments of time and effort has to be more explicitly justified. Indeed, research not only has to pay its way, but also has to demonstrate that it is the best use of the organization's available assets. For example, if undertaking a research activity means redeploying clinicians who would otherwise be engaged in a profitable area of service delivery, it is understandable if a health care provider is reluctant to take part if research income simply covers the clinicians' costs, as this means foregoing the service delivery profit they would otherwise have made. In effect, research may legitimately be seen (especially by finance directors in health care providers) as just another product line for the organization, expected to generate income and to produce surpluses in its own right.

Of course, this position wholly ignores the potential value of the research to the organization, in improving services, and to the wider NHS. But if the research was genuinely of value to health care organizations, one might expect them to be investing their own resources in doing it anyway, regardless of the external funding from NIHR and elsewhere. The fact that health care organizations expect research to pay its way, and generally do not significantly co-invest in research themselves from their own resources, seems to suggest they do not expect the research to be of immediate or direct benefit to their organization or its main strategic aims.

The medical workforce: practitioners and researchers

There have been important changes to the medical workforce as well, which impact on clinicians' involvement in research and the nature of research careers.[37] At the start of the period under review, senior doctors were employed by regional health authorities rather than by the hospitals at which they worked, they had a very high level of personal autonomy and while they would have timetabled commitments to patient care, they were able to make time in their working day to be involved in research. Similarly, doctors in training, though they frequently worked very long hours, were able to make some time for research and some undertook a research training post as part of their progression towards a consultant position. It was possible both in research-intensive settings such as teaching hospitals and in less research-oriented organizations such as district general hospitals for research-minded doctors to pursue a blended career as practising clinicians and active researchers. It was also argued that much of this practice-based research was of relatively poor quality. Since that time, medical training has been reformed to increase capacity in medical schools and to formalize and structure training programmes and progression requirements; the working hours of doctors in training have been substantially cut to conform with the European working time directive; the consultant contract has been reformed to give all consultants a negotiated job plan which sets out their planned activities including any funded involvement in research; and the nature and intensity of medical work has increased partly not only because of pressures to reduce admissions and length of stay but also because of a move towards a consultant-led service.

At the same time, of course, NIHR has invested heavily in providing training fellowships and awards at doctoral and postdoctoral levels to build clinical research capacity and to try to provide a more established academic career track, and in NHS clinical research networks. However, the probable consequence of these changes to the medical workforce is that it is now harder to pursue a blended research and clinical practice career, especially if you work outside those NHS organizations which are closely linked to universities. Again, the disaggregation of clinical and research commitments and funding streams and the increasingly pressures of service delivery will probably lead to some further separation of clinical and academic or research career tracks and communities.

Changing health care needs

Finally, and perhaps most importantly, the needs of the population served by the NHS have changed over the period of this review, and so as a consequence have the research needs of the NHS. Demographic change means that the number of elderly and very elderly people living in England has risen steadily, and as a result, the major burdens of disease and the services required to deal with them have changed too. Lifestyle and health behaviour changes, like falling smoking rates and rising rates of child and adult obesity, have also had important effects. The NHS now finds itself dealing with an increasingly elderly population, with a growing burden of largely chronic disease, increasingly multimorbidity, and a significant proportion of people whose health status and frailty means they are very high intensity users of health and social care services.[38] This means that for the NHS, two predominant concerns are how best to manage chronic disease and how to integrate the provision of health and social care services particularly for high-intensity service users. A third, and overriding concern, which we referred to earlier, was how to meet increasing demands for health care from a standstill health care budget by increasing efficiency and productivity.

These three problems are mostly concerned with service issues like pathway and process redesign, safety and quality; organizational issues like coordination, integration and networking; workforce issues like training and skill mix; and patient issues like experience, education and empowerment. Yet the research enterprise remains largely focused on life sciences and biomedicine and on the development and evaluation of technologies like drugs, diagnostic tests and devices.

To take a practical example, consider the growing incidence of dementia – there were about 600,000 people living with dementia in England in 2009, and the numbers are forecast to double within 30 years, largely through the rise in the elderly and very elderly population.[38] While the search for curative and palliative treatments for dementia must continue, it seems likely that the research which will make the greatest difference to the lives of people with dementia is that which helps to understand how best to manage the progression of the condition and maintain dignity and activities of daily living as long as possible, how to support families and carers of people with dementia, how to manage people with dementia living in residential care and how to meet the wider health care needs of people with dementia. Indeed, an NIHR dementia research initiative in 2011 resulted in 21 funded projects, almost all of which are concerned with such topics.[39] Yet these research areas largely fall outside the remit of the life sciences and biomedicine, where most health research resources are still invested.

In summary, these wider changes to the NHS seem to require, at the least, some rethinking of health research policy and strategy. In some ways, they seem to accelerate the divergence of the research enterprise from the health care delivery system which was noted at the end of the last section. But more fundamentally, they challenge preconceptions about how and at what level we set and enact research strategy in, and with, the NHS, and force us to ask whether the predominantly science-based and technology-driven research agenda meets the current and future knowledge needs of the changing NHS.

Changing the paradigm: from research production to knowledge mobilization

Our analysis so far suggests that over the last 25 years, a large and very impressive research infrastructure has been constructed in the NHS with increased funding, capacity and support for high-quality research. However, it seems that this has been achieved in part by splitting research from health care service delivery and separating the research enterprise from the service delivery, education and training functions of health care organizations and systems. We think a certain divergence of strategic purpose and organizational mission and function has resulted, which has been accentuated or accelerated by wider changes in the NHS. We suggest that this divergence or dissociation is problematic for two reasons.

First, the current understanding of how research evidence is used alongside other forms of knowledge to change practice suggests that separating research production and knowledge mobilization will adversely affect the pace and scale of innovation.[40] If we want to improve innovation, diffusion and adoption, we should be seeking to integrate research into clinical practice and organizational routines, promote the co-production of knowledge and build organizational absorptive capacity.[41] Second, as the locus of power and control in the health care system shifts from the Department of Health and becomes more diffused and situated at a lower organizational level, it becomes essential that health care organizations see the purpose and value of research to themselves. For this to happen, the research agenda needs to be set and shaped more by those organizations to meet their own research needs, not simply directed or controlled at a national or industry level, though there will always be a need for research strategy and direction at supraorganizational, national and international levels.

We have already referred to three initiatives of recent years which we think could signal a radically different approach to health research, development and innovation in the NHS, and which in different ways seek to reintegrate research, education and service delivery at an organizational or health system level –AHSCs, CLAHRCs and AHSNs. These are emergent and overlapping initiatives with much in common, though their antecedents lie in three different national policy developments. The longest established, largest and most developed of these initiatives has been the NIHR CLAHRC programme, in which NIHR invested £90 million over five years, and for which it has recently announced an extended second wave of CLAHRC funding totalling ₤120 million. It is also the only initiative which has been extensively studied and evaluated, both by the CLAHRCs themselves and by researchers commissioned by the NIHR Health Services and Delivery Research Programme. This supplement to the *Journal of Health Services Research and Policy* contains four papers from those researchers which explore the development, progress and impact of CLAHRCs from a range of perspectives.

We think there are a number of key features of CLAHRCs and, to varying degrees, AHSNs and AHSCs which offer promising lessons for future health research policy. In particular, we would point to the development of organizational capacity in knowledge mobilization; the creation of local and organizational research priorities and agendas; the explicit linking of research to knowledge mobilization; and the requirement for organizational co-investment in, and commitment to, research and knowledge mobilization. We discuss each feature in turn below.

First, CLAHRCs represent NIHR's largest ever investment in knowledge mobilization, and while the nine existing CLAHRCs have adopted a variety of conceptual models and organizational forms to do it, with varying levels of success, they have all developed organizational capacity and capability in knowledge mobilization, and rich experience of using people and institutions to promote the use of research evidence in decision making. In some, there is promising, if early, evidence that engagement in the CLAHRC has helped both to bring researchers, clinicians and managers closer together to collaborate. Many have used knowledge brokers, diffusion fellows, knowledge transfer associates and a variety of other titles for people acting as boundary spanners between research and practice, and as a result have developed a cadre of people with rich personal experience of knowledge mobilization. There is now a need to invest more in organizational capacity in knowledge mobilization right across the NHS.

Second, we noted earlier a concern that NHS organisations did not necessarily have control of the research agendas and priorities which were being pursued – that they were set externally by wider NIHR or industry stakeholders – and we questioned whether these organizations would sustain their interest in research without continuing external funding. We think it has been a great strength of the CLAHRCs that they have developed and set their own research agendas, as part of the competitive bidding process, and through extensive interactions between researchers, clinicians and managers thereafter, although we suspect there has been a varying level of real discussion and engagement within each CLAHRC partnership. We think there is a need to design research and knowledge mobilization funding arrangements so that they leave space for, and indeed encourage, the setting of local research priorities jointly between researchers, clinicians and managers.

Third, the CLAHRC model mandates research and knowledge mobilization together – there is no funding for research without knowledge mobilization and vice versa – and this seems to have great intuitive appeal. How this approach might be adopted more widely across the NHS seems worthy of discussion, since at the moment the great majority of health research spending is invested in research production and much less attention is given to knowledge mobilization. Here there may be lessons to be learned from the experience of other research funders such as the Economic and Social Research Council[42] or the Joseph Rowntree Foundation who have invested resources and effort to integrate knowledge mobilization activities into their research funding arrangements.

Fourth, NHS organisations taking part in CLAHRCs have been required to provide matched funding for NIHR CLAHRC grants, and we think this model of co-investment has a number of important benefits. It forces organizations to think prospectively about the business case for investing in research and knowledge mobilization and is likely to make them more active, discerning and demanding partners within the CLAHRC. It is also likely to encourage them to develop a meaningful local research agenda and to encourage them to engage with knowledge mobilization. We recognize that, especially in resource-constrained times, matched funding can be challenging, and it could restrict the range of NHS organisations able to participate, but the wider use of co-funding or co-investment models is worth considering, across many other areas of health research.

Conclusions

There is much to be learned from the development of research policy and practice in England over the last two and a half decades, and from experiences of research, development and innovation in the NHS in England. Such learning needs to draw on insights from the growing research literature on knowledge creation, communication and application in organizational settings and complex systems. For other countries considering reforms in this area, we hope that the analysis in this paper is helpful, particularly in situating health research and knowledge mobilization in the wider context of the health system.

We conclude that we should seek to create health care organizations which have competence and capacity in both research and knowledge mobilization. Health care organizations need to be able to combine a 'producer' model in which they undertake research to meet their local knowledge needs which they then seek to both use themselves and to export to other organizations; with a ‘consumer’ model in which they proactively seek out relevant research from elsewhere to meet local knowledge needs. They should be capable of working locally, on particular knowledge gaps in their own services; nationally, in collaboration with other organizations to address knowledge gaps which require a supraorganizational approach; and internationally on research issues which demand or deserve an international collaboration. These are not alternatives, but complementary components of a balanced, pragmatic, local and national organizational strategy for research and knowledge mobilization. A good start might be for organizations to develop such a strategy, in collaboration with other health care organizations and with research partners such as universities. We can see the genesis of such thinking in the prospectuses for recently established AHSNs.

We believe that national policy on health research needs to move from an internal focus on building research infrastructure and activity to an external focus on identifying and meeting the current and future knowledge needs of the NHS, and should take greater account of changes in the organizational arrangements, and social and financial context of the NHS. That means that the way that health research policy and strategy are set, the roles of key stakeholders and the balance of funding for different areas of health research also needs to change, to strengthen the voice of research users and to align spending on research more closely with health care spending priorities.

Finally, it is worth noting that health research policy, knowledge mobilization and innovation are important areas for research in their own right. These are complex issues, and understanding the way that organizational structures, funding arrangements, historical and professional contexts and forms of knowledge interact for beneficial outcomes is not straightforward. It was farsighted of NIHR to commission a number of research projects on the CLAHRCs and similar initiatives alongside future research investments or policy innovations are to be encouraged. This journal supplement provides a useful first summary of emerging findings, and our analysis provides a rationale for its importance and relevance.

Declaration of conflicting interests

None declared.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

1. Office for National Statistics. *Statistical bulletin. UK gross domestic expenditure on research and development*. London: ONS, 2011.
2. UK Clinical Research Collaboration. *UK health research analysis 2009/10*. London: UKCRC, 2012.
3. Hannay S, Kuruvilla S, Soper B, et al. Who needs what from a national health research system: lessons from reforms to the English Department of Health’s R&D system. *Health Res Policy Syst* 2010; 8: 11.
4. Greer SL. *Four way bet: how devolution has led to four different models for the NHS*. London: UCL Constitution Unit, 2004.
5. Shaw SE. Reaching the parts that other theories and methods can’t reach: how and why a policy-as-discourse approach can inform health-related policy. *Health* 2010; 14: 196–212.
6. Heineman RA, Bluhm WT, Peterson SA, et al. *The world of the policy analyst: rationality, values & politics*. 3rd ed. Thousand Oaks, CA: CQ Press, 2001.
7. House of Lords Science and Technology Select Committee. *Priorities in medical research*. London: HMSO, 1988.
8. Dobbs ER. The organisation and control of scientific research by the United Kingdom government. *Higher Educ* 1972; 1: 345–355.
9. Smith R. The sickening of medical research: multiple diagnoses and two remedies. *BMJ* 1988; 296: 1079–1080.
10. Black N. A national strategy for research and development: lessons from England. *Annu Rev Public Health* 1997; 18: 485–505.
11. Department of Health. *Research for health: a research and development strategy for the NHS*. London: DH, 1991.
12. Shaw SE and Greenhalgh T. Best research – for what? Best health – for whom? A critical exploration of primary care research using discourse analysis. *Soc Sci Med* 2008; 66: 2506–2519.
13. National Institute for Health Research. *Annual report 2010/11*. London: DH, 2011.
14. Culyer A. *Research and development taskforce – supporting research and development in the NHS*. London: DH, 1994.
15. Rogers D. The evolution of a local R&D strategy: the experience of a service in the UK National Health Service. *R&D Manage* 2004; 34: 57–63.
16. Smith R. An NHS research strategy: overdue but potential problems with implementation. *BMJ* 1991; 302: 1034–1035.
17. Health Economics Research Group, Office of Health Economics, RAND Europe. *Medical Research: what’s it worth? Estimating the economic benefits from medical research in the UK*. London: UK Evaluation Forum, 2008.
18. Cooksey D. *A review of UK health research funding*. London: HMSO, 2006.
19. Roberts A, Marshall L and Charlesworth A. *A decade of austerity; the funding pressures facing the NHS from 2010/11 to 2021/22*. London: Nuffield Trust, 2012.

20. Department of Health. *Best research for best health: a new national health research strategy*. London: DH, 2006.
21. Chase D, Milne R, Stein K, et al. What are the relative merits of the sources used to identify potential research priorities for the NHS HTA programme? *Int J Technol Assess Health Care* 2000; 16: 743–750.
22. National Audit Office. HC491. *Department of Health: management of NHS productivity*. London: NAO, 2010.
23. Emmanuel EJ. The future of biomedical research. *J Am Med Assoc* 2013; 309: 1589–1590.
24. Greenhalgh T, Robert G, Macfarlane F, et al. Diffusion of Innovations in Service Organizations: Systematic Review and Recommendations. *Milbank Q* 2004; 82: 581–629.
25. Nutley SM, Walter I and Davies HTO. *Using evidence: how research can inform public services*. Bristol: Policy Press, 2007.
26. Walshe K, Harvey G and Jas P. *From knowing to doing: connecting knowledge and performance in public services*. Cambridge: Cambridge University Press, 2010.
27. Institute of Medicine. *Crossing the quality chasm: a new health system for the 21st century*. Washington, DC: National Academy Press, 2001.
28. Gabbay J and le May A. *Practice based evidence for health care: clinical mindlines*. Abingdon: Routledge, 2010.
29. Dopson S and Fitzgerald L. *Knowledge to action: evidence based health care in context*. Oxford: OUP, 2005.
30. Department of Health. *High quality care for all: NHS next stage review final report*. London: DH, 2008.
31. Harvey G, Fitzgerald L, Fielden S, et al. The NIHR collaboration for leadership in applied health research and care (CLAHRC) for Greater Manchester: combining empirical, theoretical and experiential evidence to design and evaluate a large-scale implementation strategy. *Implementation Sci* 2011; 6: 96.
32. Department of Health. *Innovation, health and wealth: accelerating innovation, diffusion and adoption in the NHS*. London: DH, 2011.
33. Klein R. *The new politics of the NHS: from creation to reinvention*. Oxford: Radcliffe, 2010.
34. Cribb A. Organizational reform and health-care goods: concerns about marketization in the UK NHS. *J Med Philos* 2008; 33: 221–240.
35. Academy of Medical Sciences. *A new pathway for the regulation and governance of health research*. London: AMS, 2011.
36. Conrad L and Uslu PG. Investigation of the impact of 'Payment by Results' on performance measurement and management in NHS Trusts. *Manage Account Res* 2011; 22: 46–55.
37. Bolton SC, Muzio D and Boyd-Quinn C. Making Sense of modern medical careers: the case of the UK's National Health Service. *Sociology* 2011; 45: 682–699.
38. National Audit Office. *Dementia*. London: NAO, 2010.
39. http://www.nihr.ac.uk/research/Pages/Dementia.aspx. (2013, accessed 5 July 2013).
40. Best A and Holmes B. Systems thinking, knowledge and action: towards better models and methods. *Evidence Policy* 2010; 6: 145–159.
41. Walshe K and Davies H. Research, influence and impact: deconstructing the norms of health services research commissioning. *Policy Soc* 2010; 29: 103–111.
42. Economic and Social Research Council. *Strategic plan 2009–2014: delivering impact through social science*. Swindon: ESRC, 2009.