## Academic Health Science Networks: a new approach for driving health innovation

"By driving and enabling initiatives ... and facilitating co-ordination and joint working between other key networks and partnerships ... AHSNs can play an important role in achieving step-change advances in musculoskeletal health and care."

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Despite increasingly rapid progress in the development of new treatments, new technologies and new working practices with potential to enhance healthcare and to improve health outcomes, the often-limited capability of healthcare systems to adopt innovation continues to constrain the extent to which society benefits from high-quality research. Consequently, initiatives aimed at improving health and social care frequently fall short of achieving their maximum impact. Furthermore, organizational barriers to innovation commonly lead to cost-ineffective use of resource and the perpetuation of outmoded infrastructure and service models. This scenario, taken together with the urgent requirement to change radically the existing systems of health and social care so that they are capable of meeting the needs of the new demography, in which problems associated with aging, multimorbidity and complex conditions are increasingly prominent, presents significant challenges to healthcare systems across the world.

In England, the recent establishment of the Academic Health Science Networks (AHSNs) offers a unique and imaginative approach toward driving and spreading innovation within the NHS. The AHSNs were established in 2013, making England the first country in the world to have a national organizational infrastructure to drive health innovation. The concept and purpose of AHSNs was introduced by Sir David Nicholson in 'Innovation, Health and Wealth' [1], while NHS England's continuing emphasis on the need for highly effective

partnership platforms to drive health innovation was reinforced further in its recent 'Five Year Forward View' [2]. The AHSNs provide a unique opportunity not only to create the conditions for wider adoption in the NHS of better treatments, technologies and ways of working, underpinned by an ethos of critical evaluation and evidence of cost-effectiveness, but also to enable the drive for health innovation to serve as a major vehicle for growth, job creation and inward investment regionally and nationally. The creation of the AHSNs demonstrates NHS England's ambition of establishing, through this infrastructure, the NHS as a global leader in health innovation. Crucially, for the first time, the paramount strategic need to bring together a wide range of sectors and organizations, including local councils and enterprise partnerships, to work together on this issue has been recognized and supported.

Collectively, the 15 AHSNs cover the whole of England. Each AHSN encompasses a population of about 4 million people, which is widely regarded as an optimum population size for demonstrating the feasibility, efficacy and impact of the model. Each AHSN brings together all NHS organizations, universities, councils, local enterprise partnerships and voluntary sector organizations within its area. These include patient and public health groups, and other large local networks and partnerships involved in driving and delivering research, such as the NIHR Clinical Research Networks, as well as those involved in driving change in clinical practice, such as Strategic Clinical Networks.



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Importantly, AHSNs also work closely with the business sector at all levels, including large global companies, SMEs and entrepreneurs, to support the development of new initiatives throughout the innovation pipeline, for example, by facilitating consultancy with professional experts, supporting funding bids to national and international funding streams, and enabling collaboration with academic and clinical partners for R&D and evaluation.

AHSNs differ to some extent in their detailed organizational structures and focus, but they share a common overall purpose, namely, to build a culture of cross-sectoral partnership and collaboration focused on the health and social care needs of local populations, to speed up adoption of innovation into practice to improve outcomes and to generate economic growth. Furthermore, a framework has been established to bring together all 15 AHSNs to enable key overarching initiatives to be explored at national level.

Each AHSN has established a set of priorities around which to focus its planning and activities, many of which are thematic with potential applications in a range of clinical areas. For example, the North West Coast AHSN's [3] core work streams involve Digital Health, Medicines Optimization, Precision Medicine and Safety. The aim is to bring together combinations of innovations drawn from these themes for implementation in the NHS, ideally as part of processes for redesigning specific care pathways, identified with the local Clinical Commissioning Groups (CCGs) and of developing new infrastructure and facilities for healthcare.

Within this framework, the AHSNs house knowledge, experience and insight into a remarkably wide range of leading edge innovations and their underpinning evidence base, and are uniquely well-placed to offer this knowledge to inform the conceptualization, design and development of local infrastructure and services, including planning for new buildings and facilities. Similarly, the AHSNs are well-placed to encourage and support the link between research and innovation locally, not only in terms of enhancing pathways for translating research into practice, but also of driving new opportunities for research arising from the development, and the introduction or adoption of innovation products and practices.

While much of the work of the AHSNs focuses on innovation products, they also address issues around infrastructure development (e.g., local systems to support integrated health records, and the development of local innovation hubs and campuses), as well as workforce training, and streamlining key systems and processes (e.g., around procurement) to enable smoother pathways for innovation. These work streams all require close working with other organizations involved with leading, planning and delivering these activities, and reflect the paramount need to drive rapid change in organizational systems and behaviors as a key element of the overall initiative.

The AHSNs also have a major role in attracting funds and investment for research and innovation into their region. For example, they contribute to and support the preparation of large-scale multipartner bids for programs and infrastructure, including bids for Horizon2020 funding, as well as smaller bids to support specific project development. Furthermore, they all operate funding competitions to support local health innovation initiatives, often as matched schemes with other local partners.

In parallel with the establishment of the AHSNs, major funding schemes to support cross-sectoral working in applied and translational research and innovation have been either newly established or extended by the UK's key funding organizations and research councils, including the National Institute for Health Research, the Medical Research Council and Innovate UK. It is well-recognized that a strong national framework for funding work which has the potential eventually to feed into and utilize the AHSN infrastructure is a key requisite for the success of the initiative, both in terms of developing and delivering innovation and in terms of attracting further investment. Increasingly, the UK's medical research charities, including Arthritis Research UK, are also becoming involved, since the AHSNs offer an important route for enabling the findings of research funded by these organizations to achieve impact in clinical practice. Similarly, organizations such as Arthritis Care and the Arthritis and Musculoskeletal Alliance (ARMA) have an important role to play. The AHSNs offer a route whereby the expressed needs and views of people with conditions pertinent to these organizations can be linked to knowledge of current or emerging technologies or solutions, and potentially also to opportunities to involve people and/or their families and carers in the codesign or cocreation of new innovations to address unmet need.

The introduction of the AHSNs provides a new perspective and a valuable driver for innovation to enhance management and improve outcomes in musculoskeletal conditions. Several AHSNs have identified 'Musculoskeletal' as a major theme of activity, and examples are already emerging of joint working between AHSNs to enable wide and rapid roll out of evidence-based musculoskeletal programs across the NHS. For example, the North West Coast AHSN [3] and the West Midlands AHSN [4] are working closely together to spread adoption of the STarT Back Screening Tool [5,6], developed by colleagues at the Arthritis Research UK Primary Care Centre, Keele Univer-

sity, to reduce back pain related disability. The South London AHSN [7] is driving the wider adoption of ESCAPE-pain [8], an NICE-endorsed rehabilitation program for people with chronic joint pain. While it is too early to assess the full impact of such initiatives, there is clearly potential to achieve substantial benefit by enabling much wider access to these programs across the population. Furthermore, many areas of generic innovation being supported by the AHSNs have clear potential for applications in musculoskeletal health. For the NWC, this includes the introduction of new tools and technologies to support self management, to enable the delivery and monitoring of treatment at home, to enhance the quality and benefits of specialist consultation and assessment, and to enhance the use, benefit and safety of medicines. This also includes adoption of leading edge scientific knowledge in fields such as genomics and biomarkers as new technologies and practices become available. For example, the NWC is one of several AHSNs which are underpinning implementation of the landmark national 100,000 Genomes Project [9]. Similarly, the wide adoption across the NHS of new clinical practice in areas such as biomarkers for long-term conditions, perhaps including knee OA [SPAIN L, RAJOUB B, SCHLUETER DK ET AL. BIO-MARKERS FOR KNEE OSTEOARTHRITIS: NEW TECHNOLOGIES, NEW PAR-ADIGMS. SUBMITTED MANUSCRIPT], will be supported by the AHSNs as the case for their use and benefit becomes clear through ongoing research studies.

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Successful introduction and roll-out of such innovations will depend upon establishing effective multipartner approaches, and will probably first be implemented where strong cross-organizational working relationships already exist locally. These organizations will have the valuable opportunity to serve as international, national and regional exemplars for innovation within the specialty. The implementation process will also carry with it significant opportunities for staff development and training, for active involvement and contribution of patients, carers and local communities, and for collaborative research to further develop and evaluate the impact of the innovation. By driving and enabling initiatives in these areas, and facilitating coordination and joint working between other key networks and partnerships to deliver these aims, AHSNs can play an important role in achieving step-change advances in musculoskeletal health and care.

## Financial & competing interests disclosure

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