Commentary

Translational medicine and the NIHR Biomedical Research Centre concept

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Summary

The realization of scientific discovery being delivered to patients for their clinical benefit is termed Translational Medicine. This requires the bridging of excellence in both basic scientific endeavour and clinical care. Whilst there is consensus that it is important to drive translation for the benefit of patient care, the mechanism whereby this is to be achieved is less clear. In this article, we describe a novel strategy for the realization of effective translation that encompasses capacity building, a flexible proof of concept in man and the creation of a translational faculty adjacent to clinical research facilities that forms the basis of our NIHR Comprehensive Biomedical Research Centre. The opportunity to deliver world-class biomedical research from within the UK has never been greater.

Introduction

Translational biomedical research (TR) may be defined as the process of deriving benefit in patient care from basic scientific discovery. The UK Department of Health recently published a strategy document called Best Research for Best Health that set out a definition of TR in order to deliver real improvement in patient care. The National Institute for Health Research (NIHR) has created 12 Biomedical Research Centres (BRCs) within leading NHS and University partnerships to drive progress in translating innovation in biomedicine into NHS practice and to improve quality and safety standards within the NHS.

There are significant barriers to performing high-quality TR that have been identified previously and no real consensus about how it is best achieved. Here, we describe the strategy behind the formation of one of the five Comprehensive BRCs and set it in the context of the wider NIHR portfolio. We have also highlighted the significant challenges and opportunities that the next few years will undoubtedly bring.

The National Institute for Health Research

The NIHR was launched in April 2006 as a virtual national research facility to provide the framework for positioning, managing and maintaining the research, staff and infrastructure of the NHS in England. The creation of the NIHR aimed to provide a more strategically coherent approach for all the strands of work of NHS Research and Development, and realize the goals identified in Best Research for Best Health. The publication of the Cooksey Review into UK health research funding led to the establishment of the Office for Strategic
Coordination of Health Research (OSCHR), designed to take an overview of the budgetary division and research strategy of both the Medical Research Council (MRC) and NIHR. The development of these bodies enabled new funding strategies to be implemented, designed to allocate funding on an open, competitive basis to a large number of researchers in a transparent, fair and contestable manner, and led directly to the establishment of the 12 UK BRCs (Table 1). The challenge of this competition lead to the creation of the strategy described below that may be transferable and scalable to other centres within the UK and internationally.

Following the development of the BRCs, the creation of 12 Biomedical Research Units will allow progression of high-quality TR in fields, which are currently under-represented in the existing NIHR BRCs. The implementation of the Clinical Research Network for England aims to ensure the widespread participation of patients and health professionals in relevant clinical trials and is integrated through the UK Clinical Research Network Coordinating Centre. The need for service delivery arising from translational advances to be implemented in a safe, efficient and effective manner will be overseen by the two NIHR Research Centres for NHS Patient Safety and Service Quality (awarded to King’s College Hospital/King’s College London and Imperial College Healthcare). In addition, the establishment of Clinical Research Facilities for Experimental Medicine, the funding of key technology platforms and NIHR Collaborations for Leadership in Applied Health Research and Care throughout the country, will underpin the progression of TR across the UK in an unprecedented manner.

### Table 1  NIHR Biomedical Research Centres

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<tr>
<th>NIHR Comprehensive BRCs</th>
<th>Academic partner</th>
<th>Specialty</th>
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<td>Pediatric/child health</td>
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<tr>
<td>South London and Maudsley NHS Trust</td>
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Adapted from [http://www.nihr.ac.uk/infrastructure_biomedical_research_centres.aspx](http://www.nihr.ac.uk/infrastructure_biomedical_research_centres.aspx)

*Now Imperial College Healthcare NHS Trust*

**Academic Health Sciences Centres**

The need to drive the research advances achieved through initiatives like these into real improvements in patient care has been partly responsible for the creation of the concept of the Academic Health Science Centre (AHSC). The AHSC model seeks to integrate research, teaching and clinical care under a unified governance model with the main aim of improving patient outcomes. There are several variations of the AHSC model. Imperial College has declared AHSC status in conjunction with the merger of Hammersmith Hospitals NHS Trust and St Mary’s NHS Trust. Guy’s and St Thomas’ NHS Foundation Trust, together with King’s College Hospital NHS Foundation Trust, South London and the Maudsley NHS Foundation Trust in partnership with King’s College London have declared a formal intention to form an AHSC based on a more flexible partnership model. These changes have been stimulated at least in part by the interface of NHS and University structures that has occurred in the context of the NIHR BRCs.
A TR concept
The main aim of a BRC is to create a structure that successfully brings together scientific investigators and clinicians committed to the process of TR. This process needs to be transformative in nature in order to surmount the significant barriers that prevent high-quality patient-based research. Specifically, facilities for patient-based experimental studies should be available adjacent to biomedical scientists and clinicians involved in TR. In addition to supporting a culture of translation, such proximity provides for excellence in training by embedding students within this environment, enabling the development of a programme that will recruit clinical and non-clinical researchers in all areas of TR.

It is helpful to create a structure that identifies a proof of concept end-point in humans (Figure 1). Flexibility is essential and is determined by the clinical stage of development of the translational product and requires a partnership between the Translational Centre and the initiating research group. The product will be a discrete project that is managed and delivered through the research engine, as described in detail below.

The outcome is expected to lead to a direct benefit to patient care or if appropriate will be fed back into the pipeline for later stage development (Figure 2). The Faculty of the Centre aims to develop capacity through training of scientists, clinicians and allied healthcare professionals. This will enable the Centre to achieve common goals in focused themes of research and provide dedicated facilities to allow these common goals to be achieved with added value to the NHS.

Training and capacity building
The BRC seeks to foster educational development with the production of researchers capable of making advances and providing future leadership in health science in relation to Translational Medicine. The model for the BRC has capacity building and training of the current and future cadre of translational researchers at its heart (Figure 3). A Faculty of Translational Medicine consisting of both scientific investigators and clinicians will allow oversight of training and research initiatives within the context of the BRC. This Faculty will provide independent oversight and mentorship to the trainees within the BRC and will serve as a vehicle for driving further integration and collaboration between scientists, clinicians, allied health professionals and health service and research managers.

Figure 1. The TR concept.
**Biomedical forum**

The Biomedical Forum (BMF) is a regular meeting of the Centre Faculty focused on TR areas contained within the BRC. In addition, the BMF provides critical mentorship to the scientists and clinicians in training, an essential component of the plans for capacity building and serve as a platform for training research fellows (Figures 2 and 3). The BMF serves as the vehicle to integrate scientific and clinical disciplines in order to cultivate the exchange of ideas that will lead to effective translation. Additionally, this Forum acts as the focal point for junior doctors, clinical training fellows (including Integrated Academic Training programmes), allied healthcare professionals/students, postdoctoral/PhD students and medical students for their exposure and training in translational medicine.

**Specific capacity initiatives**

It has been recognized for many years that academic medicine has struggled to recruit the numbers of trained clinician scientists to meet UK need. The capacity shortfall in TR is even greater, with the recent historic emphasis on basic science to the exclusion of clinical research. So that the Biomedical Centre can contribute to capacity development in this area, the BMF will become part of the medical school curriculum and selected study modules (SSMs) will be offered to students in year 3 and 4 (clinical years). In addition, a novel BSc in Translational Medicine to include basic and clinical research, legal and ethical dimensions of TR, pharmacology and placement with our commercial partners is being developed. Clearly, this will also be of relevance to non-clinical biomedical students that attend the BMF. Supervision of the students will be undertaken by a clinician (or clinical academic) and a basic scientist drawn from the Faculty and mentorship will be provided by an independent member of the Faculty. Each of these activities will be based within the Centre, with write up space, seminar rooms and conversation areas that allow interaction of junior students with senior faculty. All of these facilities will be housed adjacent to the Clinical Research Facility (CRF), allowing seamless integration with the patient-based research activity, recognizing the need to build an infrastructure to support translation.

**Patient engagement**

Engagement with our patient population is a key aim of the BRC strategy. The establishment of a Patient Advisory Board (PAB) will allow wider consultation and input into the way the patient-centred research is being developed within the local area. The PAB will seek to identify problems, concerns and weaknesses perceived by patients and offer suggestions to improve the quality of clinical care within the context of the BRC. In addition, the creation of an educational module on the ethical implications of medical research to be taught in local schools as part of the National Curriculum ‘Rights and Responsibilities’ course, aims to foster a culture of understanding and knowledge between the community and the BRC from an early age.
**Strategic partnerships**

A critical component of TR is access to a large and diverse patient base. In order to maximize this vital resource, our strategy benefits from close cooperation with a number of other hospitals and academic centres. By constructing these alliances, we are able to provide research capability to the majority of London, one of the most densely populated urban regions in the world with an excellent transport infrastructure. These alliances will undoubtedly bring benefit for patients and TR through greater scientific collaboration across the capital, with increased relevance to the NHS by diversifying and increasing the size of the patient populations studied. This allows integration of multicentre analysis and outcome data within a single centre. This unparalleled access to a very large and diverse patient sample will prove an added attraction for potential pharmaceutical industry partners.

An important aspect within *Best Research for Best Health* was the explicit intention to promote the formation of partnerships with industry both within and without the pharmaceutical sector. Clearly academic and clinical centres do not seek to duplicate the capabilities available within the commercial sector and may benefit from these partnerships in a number of ways, including maximizing potential intellectual property, securing inward investment in order to reinvest in TR and benefiting from the expertise in clinical trial design and bringing a product to market. Companies can benefit from this partnership by being able to access a significant patient base and by having the opportunity to study each patient in depth, due to the academic and clinical strengths of the Translational Centre.

It is commensurate with the significant public funds being invested in this activity that we engage with other Hospital/University Partnerships that have been awarded Biomedical Centre status. We are seeking to do this by contributing to discussions with these other centres and also by participating in the creation of a Global Medical Excellence Cluster (GMEC) recently announced by the UK Government (http://www.number-10.gov.uk/output/Page10595.asp). The strategy presented here is flexible and scalable, such that it might serve as a template for wider collaboration within GMEC. Furthermore, the blueprint described may also be useful to guide the creation of an academic health sciences centre, a real partnership between clinicians, academics and allied health professionals. The opportunity to deliver world-class biomedical research from within the UK has never been greater.

**Key messages**

- Progress in translating innovation in biomedicine into NHS practice will lead to excellence in patient care and improved quality and safety standards within the NHS.
- We describe a novel strategy for the realization of effective translation that encompasses capacity building, a flexible proof of concept in man and the creation of a translational faculty adjacent to clinical research facilities that forms the basis of our NIHR Comprehensive BRC.
- The opportunity to deliver world-class biomedical research from within the UK has never been greater.

**Acknowledgements**

We would like to thank Kate Blake and Charles Wolfe for insightful comments on the article. We are particularly grateful to the Guy’s and St Thomas’ Charity for critical support with many aspects of our translational strategy.

**Strategic Partners**: The Comprehensive NIHR BRC at GSTFT/KCL has a formal strategic partnership with King’s College Hospital NHS Foundation Trust (KCHFT) and formal strategic alliances with the NHS/University Partnerships at St Bartholomew’s and the London NHS Trust/Queen Mary University of London and St George’s NHS Trust/St George’s University of London. Formal relationships also exist with the Specialist BRC at South London and Maudsley NHS Foundation Trust/Institute of Psychiatry at KCL and the Patient Safety and Service Quality Centre at KCHFT/KCL.

**Conflict of interest**: G.M.L. and R.C.T. lead the Comprehensive NIHR BRC at Guy’s and St Thomas’ NHS Foundation Trust/King’s College London (GSTFT/KCL), which has been awarded ~£52 million. K.S. is a Clinical Fellow in Translational Research funded by the NIHR BRC award.

**References**


