

## Areas of Research Interest - Research for the Department of Health (DH)

The remarkable advances in health in the last 40 years were based on basic, translational and applied science from multiple disciplines. Future advances in health, and the long term future of the NHS depend on science advancing further. England, and the UK more widely, has one of the most productive health research sectors in the world. Investing in medical research has very good return on investment socially and financially. In recognition of that, the Department of Health (DH) funds directly a substantial research portfolio through the National Institute for Health Research (NIHR), which has a budget of around £1 billion a year to invest for the health and wealth of the nation. Additionally, it has a policy research fund to inform policy decisions where there are gaps in science.

NIHR underpins training for clinical and non-clinical academics and supports research infrastructure and staff throughout England including for research funded by other bodies. This complements work on health undertaken by other funders, including the research councils (especially MRC but also ESRC and BBSRC), the Wellcome Trust and major health research charities such as Cancer Research UK, the British Heart Foundation, Alzheimer's Society, Alzheimer's Research UK, Arthritis Research UK and others. The Department of Health has responsibility for the health of England, but works with the devolved authorities for many UK priorities.

This statement of the areas of research interest aims to inform the academic community. Work in the basic, translational and applied sciences anchors and helps build the *life sciences industry*. Advances in health depend on the skills and interaction of the academic sciences and the life science industry for public benefit. Building on the current strong science ecosystem with basic and translational science is one of best ways to ensure a healthy and durable life sciences industry.

The UK has structures to ensure *coherence* between the different funders of health research. For domestic health priorities the work of the major funders is coordinated through OSCHR. For international development priorities to which DH contributes there is currently coordination through UKCDS. Joint departmental priorities are often coordinated through the Chief Scientific Advisers network or in emergencies by SAGE, which for health emergencies is jointly chaired by the Chief Medical Officer and the GCSA. The UK Clinical Research Collaboration (UKCRC) helps coordination with different areas of industry and the devolved nations.

The need of the Department of Health for research is extensive and this statement of areas of research interest (sometimes also called statement of need) cannot be comprehensive. There is a constant need for *underpinning science* including basic, translational, clinical, epidemiological, public health, social and economic research.

*Science closer to application includes:*

- Developing new products and technologies.
- Better understanding trends and environment including epidemiology and social sciences.
- Testing better methods of delivery to maximise the effectiveness and cost-effectiveness of the NHS and other health and social care delivery in the UK.

In addition to these medium-longer term needs, the Department has a constantly changing need for shorter term scientific policy products to meet more immediate policy priorities. In particular, these include *proper synthesis of existing scientific knowledge* from many disciplines, including but not exclusive to systematic reviews.

Current *Government priorities in health* are driven by a combination of Ministerial priorities, projected future public health burden and opportunities for health transformation opened up by recent advances in science. These *include*, but are not limited to:

#### 1) Antimicrobial resistance

This is a government and global priority. Scientific issues include the development of new drugs to replace failing drugs; development of better diagnostic pathways, including (but not limited to) new diagnostic tests better to target the drugs we have; understanding the drivers of antimicrobial resistance and issues such as the negative selection pressure of having antimicrobial resistance on bacteria; behavioural science to help change expectations and behaviours.

#### 2) Drugs, diagnostics and medical equipment for elderly patients

The UK is rapidly transitioning from a country where many people had a single disease or cluster of diseases for long periods to one where, as healthcare improves but the population ages, multiple morbidities will be the norm for the majority of patients treated in the health system. Understanding links between diseases and disease clustering, common pathways which can be tackled to reduce the risk of diseases, and interactions between drugs in people with multiple morbidities is going to be essential, with new technologies to underpin their treatment.

#### 3) Lifestyle diseases, diabetes and obesity

Social and economic research into drivers of what are sometimes termed lifestyle diseases including obesity, linked to public health and social intervention studies to test methods of reducing them and their impact are needed.

#### 4) Mental health, dementia

Mental health issues drag down lives of individuals and their families, and have a substantial economic impact for the individual and society. Better prevention, drug and non-drug treatment of mental health throughout the life course is a government priority. It is also a priority to identify drugs and behavioural interventions to slow, halt and possibly reverse dementia. These will need to be linked to better diagnostics. There is also a need to investigate better methods of care for those with dementia.

#### 5) Minimising medical errors

New procedures, pathways and technology to minimise the chance of harm from medical and surgical procedures. Whilst many of these will be relatively low technology (such as checklists), new technologies can also improve safety, including better informatics. Better pathways to care will protect patients and support staff.

## 6) Personalised and stratified medicine

An area with one of the greatest potentials for rapid growth is that of personalised and stratified medicine. This is likely to have its earliest impact in rare diseases and cancer treatment but in due course is likely to extend further, for example into immunology. This is an area in which the UK should seek to take a major leadership role.

## 7) Vaccines and drugs for the world's infectious diseases

The Ebola and Zika epidemics demonstrate the need to be able to detect, prevent and respond to emerging infectious threats, including ones which historically have been problems of the developing world. Pandemic influenza remains a major threat to England and the world.

### *Understanding the environment for better healthcare decision-making.*

Demography and epidemiology of diseases and future projections of the health of the nation are essential for proper forward planning. Our social, behavioural and economic drivers of healthy and unhealthy behaviours, such as those leading to obesity or over-consumption of alcohol, are important to better understand how to target interventions. The power of genetics to guide treatment is only beginning to be understood and unlocking the power of whole genome sequence and genetic markers of disease is a great opportunity for UK scientific leadership.

### *Testing interventions to maximise effectiveness and cost-effectiveness.*

The NHS and social care system will only be sustainable if we maximise the effectiveness and cost-effectiveness of all interventions. Many interventions which should in theory work, do not when tried in practice. A number of theoretically attractive concepts do not work because of behavioural issues either with individuals or with their healthcare providers. Therefore *trials*, including effectiveness trials of new drugs, techniques, public health interventions and behavioural interventions are essential to maximise clinical and public health impact, and minimise waste. This needs to be linked to economic analyses to inform policy.

### *Synthesis of existing knowledge*

The single most useful offer from the academic community in day-to-day policy-making is synthesis of existing information. Synthesis which is either rapid (responding to immediate policy needs) or better still undertaken in advance of need, can be very influential in policy decisions and ensuring they are evidence-based. The methodology for multidisciplinary synthesis is still in its infancy.

The strong partnership between the Department of Health through NIHR, the Research Councils and Universities, the Wellcome Trust, medical charities and the life sciences industry already make England and the wider UK one of the best places for medical research along the spectrum from the most basic to the most applied sciences, and the government intends to maintain that leadership.