NIHR Annual Report 2016/17

IMPROVING THE HEALTH AND WEALTH OF THE NATION THROUGH RESEARCH
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FOREWORD

This year, we celebrated the NIHR’s 10th birthday. In May, at our ‘NIHR@10’ event, we took a moment to reflect with patients, NHS colleagues, researchers, funding partners and ministers on the important contribution that the NIHR has made to people’s health and wellbeing, the research landscape and to the nation’s economy. As part of our reflections, RAND Europe published a report synthesizing 100 case studies highlighting the breadth and depth of NIHR’s impact, including: supporting research that has led to new treatments for breast cancer, more personalised and cost-effective dementia care and partnerships for research in rare disease; making the nation’s healthcare system more effective, cost-effective and safer; and building research capacity and infrastructure.

This annual report showcases the diversity of researchers we train and support, and of the research we continue to fund including how biopsy might be avoided in prostate cancer, a tool to assess quality of life for residents in care homes, and how to improve social care for people with mental health problems. The research we funded is contributing to our understanding of rising health challenges and informing how we can tackle them. For example, the NIHR School for Primary Care Research published research into the management of multiple morbidities, helping to underpin new NICE guidance in this area.

Collaborations with medical research charities, companies large and small, and other government funders continues to be an important element of the NIHR research portfolio. More than 1,000 members of the public registered their interest in reviewing research project applications and we continue to look for new ways to further enthuse and engage patients and the public in our work.

We announced new funding of £981 million funding for world-class research infrastructure across the NHS over the next five years - our largest ever investment. This will help translate research into real world benefits for patients for many years to come. Our Clinical Research Network recruited over 665,000 people into clinical research studies this year, our highest ever level of participation, with the involvement of all but one NHS Trust. New Official Development Assistance funding has enabled us to set our sights on helping to improve research capability and capacity elsewhere in the world, building on the UK’s strengths in applied health research. There has been a tremendous response from the community to working via NIHR to help address issues affecting the poorest and most vulnerable people in lower and middle income countries.

Part of our role is to ensure that we have a research workforce able to address the evidence needs of the health and care system of the future and we commissioned a formal review of NIHR training to inform our planning for this. It is also vital that NIHR processes do not stagnate and we initiated work to simplify these and examine the use of digital approaches.

We are grateful to all the people, patients and carers who have contributed to NIHR research this year.

Dr Louise Wood
Director of Science, Research and Evidence
Department of Health and Social Care

Professor Chris Whitty
Chief Scientific Adviser
Department of Health and Social Care

INTRODUCTION

We are the National Institute for Health Research (NIHR). Established by the Department of Health in 2006, the vision for the NIHR is to improve the health and wealth of the nation through research. We do this by:

- funding high quality research to improve health
- training and supporting health researchers
- providing world-class research facilities
- working with the life sciences industry and charities to benefit all
- involving patients and the public at every step.

In this annual report, we focus on how, during 2016/17, the NIHR has worked towards these aims by:

- funding research to improve the health of patients and the public, and to improve health and care services
- translating breakthrough discoveries into practical products, treatments, devices, procedures and interventions for clinicians and other users of research evidence
- training and developing researchers to keep the nation at the forefront of research internationally
- working with the life sciences industry to help patients gain earlier access to breakthrough treatments and to encourage broader investment in, and economic growth from, health research
- ensuring that the NHS is able to support all research funders, such as the life sciences industry, charities and public funders, to benefit patients, the public and the health and care system
- involving patients and the public across all of our work and enabling patient participation in research.
THE YEAR IN NUMBERS

The information in this report represents the period from 1 April 2016 to 31 March 2017 unless otherwise stated.

FUNDING RESEARCH

We awarded £207 million of funding to 263 new high quality research projects in 2016/17, increasing our spend by more than a quarter on 2015/16:

- £7.8 million to 70 new projects through our three research schools: School for Primary Care Research, School for Public Health Research and School for Social Care Research.

- We awarded new funding for world-class research facilities in the NHS:
  - £816 million over five years for 20 NIHR Biomedical Research Centres (BRCs)
  - £112 million over five years for 23 NIHR Clinical Research Facilities (CRFs)
  - £17 million investment into three NIHR Patient Safety Translational Research Centres (PSTRCs)
  - £36 million over five years for 18 Experimental Cancer Medicine Centres (ECMCs), in collaboration with Cancer Research UK and the Health Departments for Scotland, Wales and Northern Ireland.

Our Research Design Service (RDS) supported 2,859 new research projects in 2016/17. A total of 392 RDS-supported projects won funding, 264 of which were funded by the NIHR.

TRANSLATING DISCOVERIES

We shared information on the outputs of our research through our publication and dissemination activities:

- 18,632 research papers published on NIHR-funded research
- 54,500 people a month visited our Journals Library in the four months since relaunching the website in November - an increase of 58% on the previous eight months
- 175 NIHR Signals (accessible summaries of research) published by our Dissemination Centre, selected from an initial sift of over 12,000 journal articles
- NIHR Signals viewed over 110,000 times during the year.

TRAINING RESEARCHERS AND LEADERS

We supported the next generation of researchers and leaders:

- 129 new personal career development awards made
- Over 3,585 researchers held NIHR-funded training and career development awards
- 230 people supported by our leadership programme, taking total number of participants to almost 800 since the inception of the programme: 411 Leaders, 237 Trainees, and 140 Research and Development Managers and Directors (representing 114 NHS Trusts)
- Over 3,500 journal articles published by researchers funded by our career development awards.
ECONOMIC GROWTH
Our work with the NHS and the life sciences industry contributed to the economic growth of the country.
- 237 patents granted arising from research funded by the NIHR
- 69 patents granted for research from NIHR Biomedical Research Centres and Units (BRCs/BRUs), which also filed 161 patent applications
- £59.7 million generated from exploiting intellectual property held by BRCs and BRUs, and one spin-off company established
- More than 3,500 industry collaborative and contract research studies supported by NIHR research infrastructure
- 1,399 individual research partnerships and collaborations with small and medium-sized enterprises (SMEs) reported by NIHR research infrastructure
- £59.7 million generated from exploiting intellectual property held by BRCs and BRUs, and one spin-off company established
- More than 3,500 industry collaborative and contract research studies supported by NIHR research infrastructure
- 1,399 individual research partnerships and collaborations with small and medium-sized enterprises (SMEs) reported by NIHR research infrastructure
- Anonymised data to support research on more than one million additional patients added securely to Clinical Practice Research Datalink (CPRD), and over 270 new research studies using the data approved.

PUBLIC INVOLVEMENT AND PARTICIPATION
We involved patients and the public at every step of the research funding and delivery process.
Funding research:
- 1,096 public reviewers registered to review research project applications
- 741 reviews completed by our public reviewers
- 98 members of public sat on our grant awarding panels.
Taking part in research:
- 10,768 people registered with Join Dementia Research (JDR), taking the total to 27,433
- 40 JDR champions (people with dementia and carers) actively promoting the service across the country.
Promoting patient and public involvement in research:
- 156 opportunities for public involvement in research advertised on our People in Research website
- Over 500 enquiries received by our public involvement initiative, INVOLVE
- 166 patients and researchers registered as Patient Research Ambassadors, bringing total number to 700.

RESEARCH IN THE NHS
We provided clinical research infrastructure throughout England to help patients and health professionals participate in clinical research studies within the NHS.
- More than 665,000 participants recruited into clinical research studies in the NHS this year
- Anonymised data to support research on more than one million additional patients added securely to Clinical Practice Research Datalink (CPRD), and over 270 new research studies using the data approved.

FUNDING RESEARCH
We fund research to improve the health of patients and the public, and to improve health and care services.
We have a comprehensive range of research programmes which fund projects through both commissioned calls and researcher-led calls. Our programmes offer a focused source of funding for researchers with the aim of providing evidence to inform decision making by health and care professionals, NHS managers, patients and the public, and policy makers.

KEY HIGHLIGHTS
- We invited universities and research institutes to bid for funding for global health research to benefit people in low and middle-income countries across the globe. Applications were received from nearly 60 institutions, covering a wide range of countries and disease areas. So far, a total of £83,973,115 has been awarded to 13 Global Health Research Units and £38,499,736 to 20 Global Health Research Groups.
- We funded a second term of the NIHR School for Primary Care Research, providing £20.5 million over five years to support eight leading academic centres to build the evidence base for effective public health practice.
- The NIHR School for Primary Care Research has undertaken a considerable amount of research into management of multiple morbidities; a key priority for the NIHR. The papers resulting from these projects have been highly influential, including being cited in the 2016 NICE guidance on multimorbidity.
- Our Journals Library website has been relaunched. This is the first stage in an ongoing programme to improve the completeness, transparency and accessibility of the library. Information from all stages of research projects is incorporated onto individual web pages, allowing a ‘thread’ of information to build up over the lifetime of the research. These pages include the study protocol and extracts from the application form, through to the final Journals Library report, related articles and beyond, providing access to the full story of NIHR research projects.
- In May the Department of Health invited bids for the continued provision of three of the NIHR Coordinating Centres – the NIHR Evaluation, Trials and Studies Coordinating Centre (NETSCC), the NIHR Central Commissioning Facility (CCF) and the NIHR Office for Clinical Research Infrastructure (NOCR). The procurement procedure used throughout the process was in line with the Public Contracts Regulations 2015 – Competitive Procedure with Negotiation. The incumbent suppliers – the University of Southampton for NETSCC and LGC Ltd for CCF and NOCRI – successfully bid for new contracts starting in April 2018.

In December 2016 we received a ‘Plain English Award’ from the Plain English Campaign for making plain English summaries a requirement in funding applications. This was judged to make a significant contribution to clear communication.

We funded a second term of the NIHR School for Public Health Research, providing £20.5 million over five years to support eight leading academic centres to build the evidence base for effective public health practice.
DELIVERING IMPACT

A groundbreaking health data platform to analyse trends in heart disease

The UK is the only country where national cardiovascular disease registries and primary care data are available at scale for research. The CALIBER programme, led by Professor Harry Hemingway and funded by Programme Grants for Applied Research (PGfAR), linked four electronic health record data sources. This created a research platform that can securely analyse five billion rows of anonymous data from two million patients and help inform improvements in disease prevention, diagnosis and treatment.

Professor Hemingway and his team at University College London Hospitals NHS Foundation Trust queried the data to follow up people at risk of, or with, cardiovascular diseases. Their analysis of data from 1.25 million adults found that, despite modern preventative medication, people with hypertension still have a high lifetime risk of subsequent cardiovascular disease.

Inducing labour in pregnant women aged 35 and over shown to be safe

Pregnant women aged 35 and older are at increased risk of unexplained stillbirth. Induction of labour at term is thought to reduce this risk but also to increase the risk of an emergency caesarean. A randomised controlled trial funded by our Research for Patient Benefit Programme (RfPB) found that inducing labour at 39 weeks in older women having their first baby had no significant effect on the rate of caesarean deliveries compared with spontaneous labour. In addition, induction of labour was not associated with a higher rate of interventions or of complications in the mother (such as heavy bleeding requiring blood transfusion) or baby (such as severe infection).

These findings, published in the New England Journal of Medicine, may reassure women aged over 35 that labour induction carries no more risk of having a caesarean than spontaneous labour.
Avoiding unnecessary biopsy

The Prostate MRI Imaging Study (PROMIS) is a landmark trial funded by our Health Technology Assessment (HTA) Programme that could help detect men at risk of prostate cancer and determine the best treatment. It assessed the effectiveness of multi-parametric magnetic resonance imaging (MP-MRI) of the prostate in men identified as being at high risk of prostate cancer. The imaging was carried out before a biopsy to see if this would be more accurate in terms of identifying men who do not need biopsies and detecting clinically important cancers.

The team, led by Professor Mark Emberton of University College London, recruited 576 men at 11 centres across the UK. Their results, published in The Lancet, found that using MP-MRI to help detect prostate cancer could help to avoid unnecessary prostate biopsies for over a quarter of men identified as being at high risk.

Impact of e-cigarettes on young people

A study funded by our Public Health Research (PHR) Programme was the first to examine the relationship between adolescents’ recollection of e-cigarette displays at point of sale and their self-reported past use and future intention to use e-cigarettes.

The study of 3,808 Scottish adolescents found those who recalled seeing e-cigarettes in shops were more likely to have tried them in the past and were more likely to intend to try them in the future. Young people who had tried e-cigarettes in the past were found to be more likely to intend to use them again.

The study also found a link between e-cigarette use in ‘never smokers’ and their subsequent first experimentation with cigarettes in the following year. In a paper published in BMJ Tobacco Control, the team concluded young never smokers are more likely to experiment with cigarettes if they have tried an e-cigarette.

Partnering with public health professionals to evaluate new initiatives

Members of the NIHR School for Public Health Research (SPHR) have leveraged funding from charities as well as Public Health England to support the Public Health Practice Evaluation Scheme (PHPES). The scheme aims to address the challenges faced by public health practitioners working on the ‘front line’ – in the NHS, in local authorities and in the third sector. PHPES enables these professionals to work in partnership with SPHR to conduct rigorous evaluations of the cost effectiveness of the innovative local public health initiatives they’re introducing.

Among a number of projects, PHPES has performed two evaluations of the National Diabetes Prevention Programme and an evaluation of the impact of a Cumulative Impact Zone Policy to reduce alcohol-related harms in Islington Local Authority. The latter found that the Policy seemed to lessen the number of alcohol-related harms but did not negatively affect the night-time economy.

A tool to assess quality of life in care homes

Four interlinked studies funded by the NIHR School for Social Care Research explored the use of the Adult Social Care Outcomes Toolkit (ASCOT) in care homes. The first three sought to adapt ASCOT to allow for the measurement of residents’ quality of life, and the fourth is piloting the adapted tool. This tool also allows care homes to review the quality of their services in line with recommendations from the Care Act (2014).

The team at the Personal Social Services Research Unit (PSSRU), University of Kent, have gone on to win funding from our Health Services and Delivery Research (HS&DR) Programme for a follow up study. The adapted ASCOT has also attracted international interest and was piloted as a quality indicator in the Australian government’s national aged care quality indicator programme in 2016.
Improving social care for people with mental health problems

Research funded by the NIHR School for Social Care Research has developed the Connecting People Intervention to help the recovery of people with mental health problems. This model of best practice supports people with mental health problems to create and maintain social relationships, improving their quality of life and reducing service use and the associated costs.

In 2016, the Connecting People Intervention was recommended by the Department of Health’s strategic statement for mental health social work and has now become a core component of the Think Ahead curriculum, a new route into mental health social work. The model has also been developed for use in Sierra Leone following the Ebola outbreak and in South East Nepal for debt bonded labour communities.

Online antimicrobial tool to reduce the effects of drug resistant infections

The NIHR Health Protection Research Unit (HPRU) in Healthcare Associated Infections and Antimicrobial Resistance at Imperial College, with support from Public Health England, has developed an online tool that provides direct access to prescribing guidance. This tool will support clinicians to quickly identify the appropriate infection when prescribing antimicrobial drugs to children and adults.

The Point of Care Antimicrobial Stewardship Tool (POCAST) is a mobile-enabled website that provides the latest Public Health England guidelines at the point of care. The tool should reduce unnecessary prescribing in primary care and help Clinical Commissioning Groups meet their targets in terms of reducing prescribing levels.

The health benefits of ‘green exercise’

Natural environments, such as parks, woodlands and beaches, are key locations for physical activity. Researchers from the NIHR HPRU in Environmental Change and Health at London School of Hygiene and Tropical Medicine analysed data from the world’s largest study on recreational visits to natural places to estimate that over eight million adults in England engage in ‘green exercise’ each week.

Using two separate costing methodologies – from NICE and the World Health Organization – the researchers published a paper in Preventative Medicine, which identified over 1.3 billion annual green exercise visits, delivering health benefits worth up to £2.2 billion a year.

TRANSLATING DISCOVERIES

We translate breakthrough discoveries into practical products, treatments, devices, procedures and interventions for clinicians and other users of research evidence.

Our research programmes, together with our world-class infrastructure in the NHS, work to drive faster translation of scientific discoveries into tangible benefits for patients. This includes taking clinical research from early to later stages and appraising research outputs and emerging health technologies.

KEY HIGHLIGHTS

- We held an open competition for our NIHR Horizon Scanning Centre to understand global trends – and global needs – in health innovation. The new £10 million NIHR Innovation Observatory, hosted by Newcastle University and co-located with the National Institute for Smart Data Innovation, will use state-of-the-art data analytics to explore trends in health innovation across drugs, medical technologies, diagnostic tools and healthcare services.

- We also launched a new competition to designate and fund NIHR Medtech and In vitro diagnostic Co-operatives (MiC). This competition will provide NIHR infrastructure funding for NHS organisations to act as centres of expertise for the development of medical technologies and/or the generation of high quality evidence on commercially supplied in vitro diagnostic tests. These organisations will replace the Healthcare Technology Co-operatives (HTCs) and Diagnostic Evidence Co-operatives (DECs), but will incorporate and retain the merits of both schemes.
DELIVERING IMPACT

Investigating a cure for Crohn’s disease

Crohn’s disease occurs when the gut immune system becomes allergic to its bacterial content and causes bowel inflammation. Despite the best available treatments, some people suffer debilitating symptoms from the disease. A new trial funded by our EME Programme, in partnership with the Medical Research Council (MRC), is investigating if the disease could be ‘cured’ with hematopoietic stem cell transplantation (HSCT).

Previous research has shown promising results and this study will test if HSCT is an effective and safe option for treating Crohn’s disease. HSCT could improve the quality of life for patients with Crohn’s and help patients avoid multiple operations which can result in a stoma.

A point-of-care device for the rapid detection of stroke

Stroke, one of the leading causes of death and disability in the UK, is a highly treatable neuro-emergency. Outcomes are better for patients if strokes are rapidly recognised and treated. Through i4i funding, Professor Nicholas Dale at University Hospitals Coventry and Warwickshire NHS Trust led a research project to develop a point-of-care device that enables rapid diagnosis of stroke via a finger prick volume of blood. His team collaborated with Sarissa Biomedical Ltd in the development of SMARTChip. Together they won Small Business Research Initiative Phase 2 funding from Innovate UK (£2m over three years) for a large-scale clinical evaluation involving 260 paramedics and 1,350 patients.

The diagnostic performance of SMARTChip in discriminating true strokes from similar conditions is expected to improve use of NHS resource and save hyperacute stroke units £25m per year.

A new device for detecting HIV

Researchers at our Imperial Biomedical Research Centre (BRC), in collaboration with the Imperial spin-out DNA Electronics Ltd and the NIHR DEC, London, have developed a point-of-care test for the HIV virus that could be performed on a USB stick.

The device uses a drop of blood to detect the ‘viral load’ of HIV, increases in which indicate that the patient has developed resistance to ongoing treatment. The device then creates an electrical signal that can be read by a computer, laptop or handheld device within 30 minutes to a high degree of accuracy. This helps to speed up clinical decision making, as currently tests to detect the HIV viral load involve sending blood samples to a central laboratory.

Patients with HIV could use the new disposable test to monitor their own treatment, enabling the disease to be managed more effectively in remote locations. Furthermore, regular monitoring of viral levels allows healthcare teams to check if a patient is taking their medication. Stopping medication fuels resistance to HIV drugs, which is a growing problem worldwide.

Identifying the genetic basis of rare diseases

The BRIDGE consortium, run by NIHR Cambridge BRC, is an umbrella group for Next Generation DNA Sequencing (NGS) projects, also known as high-throughput sequencing. The projects aim to discover the genetic variations underlying inherited rare diseases and to evaluate exome sequencing and other approaches for identifying already known genetic variants.

Participants in BRIDGE studies are enrolled in the NIHR BioResource - Rare Diseases, a collaboration between our BRCs to identify genetic causes of rare diseases, improve diagnosis and develop treatments. 1,700 patients have been recruited into this BioResource to date, representing 50% of all UK patients with primary immunodeficiencies.

BRIDGE study participants with rare diseases were also offered the opportunity to become part of the 100,000 Genomes Project being led by Genomics England, a company wholly owned and funded by the Department of Health. With their consent, their de-identified data has been combined with the 100,000 Genomes Project dataset to enable further research into the genetic causes of rare disease. By the end of March 2017, the combined data bring the 100,000 Genomes Project total to over 29,000 whole genomes. £250m of NIHR funding for genomics over five years was committed as part of the 2015 Spending Review.

Raising the bar for CAR T-cell therapy

Our Experimental Cancer Medicine Centre (ECMC) at King’s Health Partners has pioneered the technology behind CAR T-cell therapy, where a patient’s own T-cells are removed, engineered in the laboratory to kill their cancer cells, and returned to the body. This approach has shown promise in haematological cancers.

The ECMC - which is jointly funded with Cancer Research UK and the Departments of Health for Scotland, Wales and Northern Ireland - is now extending this technique to solid tumours in a phase I study. This study is using a new CAR T-cell therapy with three distinct features that could prove beneficial in head and neck tumours.

Firstly, the ECMC team is injecting CAR T-cells directly into tumours rather than into the bloodstream, reducing toxicity. Secondly, the immunotherapy molecule is being designed to work on multiple receptors, making it theoretically much more difficult for a tumour to become resistant. Thirdly, they are using an innovative step to make CAR T-cells more responsive to immune cells, so that several billion CAR T-cells can be generated from as little as 40ml of patient blood.
Good Clinical Practice is the international ethical, scientific and practical standard to which all clinical research is conducted. We train and develop researchers to keep the nation at the forefront of research internationally. Our research training and career development programmes focus the talents of our people on health and social care research that meets the current and future needs of patients and the public. Our programmes also develop and sustain training routes for research skills to support the development of future leaders across all professions and disciplines.

Over 5,500 researchers are supported annually by NIHR – this breaks down as 53% doctors, 17% other healthcare professionals (including research nurses), and 30% professionals in science and people in non-healthcare roles. NIHR training funding can be targeted at areas of research need, for example boosting numbers in dementia, genomics and emergency care.

KEY HIGHLIGHTS

- We launched a strategic review of our training. An initial output from this was ‘An evaluation of 10 years of the NIHR Academic Clinical Fellowship programme’, published in the BMJ.
- To encourage institutions to support women in senior academic positions, we altered the eligibility criteria for our prestigious Research Professorship award. This led to more female nominees (55%) being put forward than males for the first time in the scheme’s history.
- We created an NIHR Training and Career Development Webinar channel, which brought together 12 existing webinars and attracted a total of over 10,000 registrations.
- We provided a new leadership programme for 66 people in the research delivery system.
- Writing for Publication, the most popular webinar, attracted over 1,000 registrations and 650 people (60%) watched it live.
- This year, 30,318 individuals accessed our e-learning Good Clinical Practice (GCP)1 course, and 6,826 people attended GCP workshops provided by our Local Clinical Research Networks.
- A Delegation and Training Decision Aid was launched this year to support proportionate GCP training for high quality research. This free tool is designed to help local research delivery sites consider what individuals are being asked to do in the context of an individual research project, and what training and learning they need to be effective in their role.

DELIVERING IMPACT

Progression of Career Development Award Holders to Senior Investigator

Our Senior Investigators (SIs) are among the most prominent and prestigious researchers funded by the NIHR and are outstanding leaders of patient and people-based research. New awards are made annually and almost 400 researchers have been appointed to date. As we reach our 10th year, we are now seeking to progress research leaders who have been supported by senior career development awards to SI status.

1Good Clinical Practice is the international ethical, scientific and practical standard to which all clinical research is conducted.
This year Professor Louise Robinson, an NIHR Research Professor, and Professor Ibrahim Abubakar, an NIHR Senior Research Fellow, were among 41 researchers who were successful in being appointed as NIHR Senior Investigators.

Louise Robinson’s research programme is focused on primary care and ageing and the wellbeing of older people, especially those with dementia. She is Director of the Institute for Ageing at Newcastle University. Her NIHR Research Professorship has focused on improving the quality of community care for people diagnosed with dementia and their families with the aim of identifying cost effective, evidence-based interventions and exploring innovative approaches to future care including assistive technologies. She developed and led a successful bid to establish the National Innovation Centre for Ageing and Innovation (NICA) at Newcastle University, a unique interdisciplinary centre where the public and patients, NHS and local authority staff, researchers and industry come together to develop devices and products for market that promote healthy ageing and independence in later life.

Recent outcomes of her NIHR Professorship include the award of an Alzheimer’s Society National Centre of Excellence in Dementia Care and a new NIHR Global Health Group on Dementia Prevention and Enhanced Care (DePEC) at Newcastle University, working with partners in Tanzania, India and Malaysia to improve dementia care internationally.

Ibrahim Abubakar was awarded a five-year NIHR Senior Research Fellowship in December 2011 to carry out important research into improving the detection of latent tuberculosis (TB). Cases of TB in the UK have been on the rise since the 1980s and the World Health Organization (WHO) estimates that up to a third of the world’s population could be infected with latent TB.

Career Development Award Holders delivering research impacts

Artificial pancreas found to be safe for pregnant women to use at home and in hospital

The management of type 1 diabetes in pregnancy can be challenging. Evidence shows that half of all babies born to mothers with type 1 diabetes experience complications.

A study carried out by Career Development Fellow Professor Helen Murphy and Academic Clinical Fellow Zoe Stewart at the University of Cambridge and the University of East Anglia respectively has shown that pregnant women with type 1 diabetes can safely use an artificial pancreas at home and in hospital.

People with type 1 diabetes cannot produce insulin and usually have to monitor their blood glucose levels and administer daily injections of insulin. An artificial pancreas constantly monitors blood glucose levels and dispenses insulin as and when required via a pump. It can provide better glucose control than any other currently available treatment and therefore substantially improve outcomes for mother and baby.

This important study was published in the New England Journal of Medicine.
Health equity indicators for the English NHS - helping to prevent costly health emergencies in disadvantaged populations

Health Economist Professor Richard Cookson is an NIHR Senior Research Fellow at the University of York. His research with colleague Miqdad Asaria estimated that socioeconomic inequalities cost the NHS in England around £12.5bn in 2011 in terms of additional hospital and primary care. His team also found that the more deprived the neighbourhood that someone lives in, the more likely they are to suffer a potentially avoidable emergency admission to hospital.

Successful pilot of a guideline implementation intervention for obesity management by midwives

Dr Nicola Heslehurst is a Public Health Nutritionist based at Newcastle University who completed her NIHR Postdoctoral Fellowship in March 2017. During the award she established the feasibility of a new training intervention for midwives to support them with the implementation of weight-management guidelines for pregnant women. Funding is now being sought to assess the effectiveness of the intervention in a full clinical trial.

Dr Heslehurst also conducted two systematic reviews highlighting the importance of investing in training support for midwives and the lack of current or ongoing research in this area. These were included in the WHO Maternal Nutrition: the Best Start in Life report. She delivered a workshop on her NIHR research at the report launch in Latvia in June 2016. She is also a member of an EU consensus group on pregnancy after bariatric surgery.

**ECONOMIC GROWTH**

We work with the life sciences industry to help patients gain earlier access to breakthrough treatments and to encourage broader investment in, and economic growth from, health research.

We leverage inward investment through the NIHR research infrastructure, and offer world-class research capability to conduct high quality clinical studies to underpin the nation’s international competitiveness. As part of this, we enable and support collaboration with the life sciences industry through the NIHR Office for Clinical Research Infrastructure (NOCRI), NIHR Translational Research Collaborations and NIHR research programmes such as the Invention for Innovation (i4i) Programme.

By supporting the development of a highly skilled health research workforce, we improve the nation’s ability to undertake and attract world-class health and life sciences research.

We also have an indirect role in economic growth by funding independent research that generates evidence to improve prevention, diagnosis, treatment and care, which helps reduce associated costs to the economy.

**KEY HIGHLIGHTS**

- More than 34,600 participants were recruited to participate in high quality life sciences industry research by our Clinical Research Network (CRN), bringing the total over the past five years to more than 150,000.

- We added 729 new commercial contract research studies to our CRN Portfolio this year; a 12% increase from 2015/16.

- Through the early feedback programme offered by our Study Support Service, NHS clinical experts provided specialist insight for more than 250 upcoming studies. The service also made more than 360 new commercial studies available for NHS providers to participate in through its site identification programme.

- We championed the benefits of a single research intelligence system to research and development offices that currently use different and isolated systems to record study delivery information at site level only.

- We recruited the first patients onto 27 global research studies, demonstrating our ability to support the rapid set-up and recruitment of studies.
Through supporting infrastructure collaborations and sign-posting activities, NOCRI facilitated the development of 100 active research projects. Of these, 45 projects involved an industry partner and 19 were new research projects.

Our 13 Health Protection Research Units (HPRUs) leveraged £86 million in external research funding, a 58% increase compared with 2015/16.

Our contribution to economic growth was recognised at the 2016 Civil Service Awards, where the Research Faculty, Training, Infrastructure and Growth team at the Department of Health won the Supporting Growth Award. This award recognises the work that has been undertaken by the NIHR to encourage improved productivity and contribute to strong sustainable growth in the UK.

**DELIVERING IMPACT**

**Supporting a small medical device company to develop new technologies, create jobs and grow in value**

Since 2010, we have supported Creo Medical (based in Chepstow, Wales) through three i4i awards totalling £2 million. Using NIHR funding, Creo Medical has developed a suite of tools for an electrosurgical system for the quick, safe and accurate removal of pre-cancerous and early cancerous growths in the lower gastrointestinal tract.

These tools will help to reduce complications during surgery by reducing bleeding and allowing operations to be performed using non-invasive techniques such as endoscopy.

Launching new surgical tools is expensive, but in December 2016 Creo Medical successfully issued shares valued at £20 million. This additional funding was obtained by convincing investors that the products had a clinically relevant future based on research results funded by i4i. The new funding will allow Creo Medical to launch their products on the market so that they can be used in the NHS and hospitals around the world.

Our support has also enabled Creo Medical to create 30 jobs in the UK and to grow to a point where it is valued at £66 million.

**Supporting global partnerships**

Athena Vision Limited, a biopharmaceutical spin-out from NIHR Moorfields Biomedical Research Centre (BRC), entered into a global partnership with MeiraGTx Limited to develop and commercialise Athena’s ocular gene therapy programmes. MeiraGTx will advance Athena’s pipeline of gene therapies through clinical trials to commercialisation, in collaboration with the NIHR Moorfields Clinical Research Facility (CRF).

The programme comprises a portfolio of novel gene therapies targeting conditions causing severe sight impairment in adults and children.

The CRF provides the specialist technology, skilled personnel and supporting infrastructure for the assessment of visual function and retinal structure of candidates and participants before and after intraocular administration of the gene therapy vector.

Meira GTx viral vector manufacturing facilities
Delivering early phase cancer trials to support fast-track FDA approval

Our Experimental Cancer Medicine Centres (ECMCs) provide a fertile environment for ground-breaking studies that expand treatment options for cancer patients worldwide.

A recent multicentre, international study led by our ECMC at Barts tested atezolizumab, a new checkpoint inhibitor drug developed by Roche, in phase I trials across 20 sites in the UK and internationally.

The results were striking: after six weeks of treatment, tumours that expressed the PD-L1 protein had shrunk in nearly half of patients. As a result, the drug received breakthrough designation status from the US Food and Drug Administration and was fast-tracked for regulatory review. In May 2016, atezolizumab became the first drug approved for bladder cancer in the US for more than 30 years.

Supporting clinical research activity to generate value, jobs and NHS revenue

In September 2016 a report published by KPMG examined the economic impact of clinical research activity supported by the NIHR CRN, the monetary benefits to the NHS and the value added by the CRN’s support services.

The report estimated that in 2014/15 CRN-supported clinical research activity generated £2.4 billion of gross value added (GVA) and almost 39,500 jobs in the UK. In addition to the economic impact of clinical research activity, the NHS benefited from revenues and cost savings totalling an estimated £192 million.

For commercial studies, NHS Trusts received an average of £6,658 in revenue per patient from sponsor companies, and an average pharmaceutical cost saving of £5,250 per patient where a trial drug replaced the standard of care. This equates to estimated totals of £176 million of commercial income and £16 million of pharmaceutical cost savings across the commercial CRN Portfolio in 2014/15.

RESEARCH IN THE NHS

We fund a range of infrastructure in the NHS and partner universities to ensure the NHS is able to support all research funders, such as the life sciences industry, charities and public funders, to benefit patients, the public, and the health and care system.

For example, through the NIHR Clinical Research Network (CRN) we provide the infrastructure that allows high quality clinical research to be undertaken throughout the NHS, meet the costs of NHS staff and of using research facilities, and provide practical help in identifying and recruiting patients for studies. Our Clinical Research Facilities (CRFs) provide dedicated and purpose-built facilities where specialist clinical research and support staff from universities and NHS Trusts can work together on patient-orientated studies. We support the Clinical Practice Research Datalink (CPRD), in partnership with the Medicines and Healthcare products Regulatory Agency (MHRA), to provide access to anonymised NHS data for observational and interventional public health research.

KEY HIGHLIGHTS

- More than 665,000 participants took part in clinical research studies on the CRN Portfolio this year. This is the highest annual figure to date and represents a 10% increase from the previous year.

- As a priority research area, we continued to support the Government’s Dementia Challenge. In 2016/17, we supported nearly 28,000 people to participate in clinical research associated with dementias and neurodegeneration and delivered 91% of these studies to time and target.

- The success of our campaign to engage trusts at board level in the results of the 2015/16 NIHR NHS Research Activity League Table was reflected in 2016/17 figures. Overall, 65% of trusts increased their research activity this year, demonstrating the growing appetite for research within the NHS.

- We supported more high quality research than ever before. There were 2,055 new studies on our Portfolio, which represents a 15% increase in the number of new studies compared to the previous year.

- The number of participants accessing new and better treatments as a result of taking part in studies supported through our primary care specialty research network reached one million. The NIHR marked the milestone with a renewed call to increase the level of commercial research activity within the NHS, ensuring there are opportunities to take part across all healthcare sectors.

- There continued to be high levels of participant recruitment among healthcare organisations: 99% of trusts and 48% of General Medical Practices were actively engaged in clinical research. In addition, 79% of NHS trusts recruited patients into commercial contract research studies.
A national survey about nurses’ attitudes towards research was carried out in partnership with the Nursing Times and Health Education England. It found that nearly two-thirds of nurses believe there is insufficient opportunity to build research into their job or career, with lack of time and information cited as the major barriers. The results were featured in a double-page spread in the Nursing Times, and the survey was also the subject of the editor’s feature column ‘Editor’s view’ in the print edition and online versions of the magazine.

DELIVERING IMPACT

Changing practice in the prevention of preterm labour

Available data suggested that administering progesterone could reduce the risk of a preterm birth and neonatal morbidity in high risk women. The OPPTIMUM study, funded by our Efficacy and Mechanisms Evaluation (EME) Programme, looked at whether the use of progesterone affects neonatal and childhood outcomes.

The NIHR supported all 65 UK study sites between 2009 and 2013, examining more than 15,000 patient records and screening more than 5,800 women using fibronectin testing. With this support from the NIHR, the study recruited 1,228 women to time and target. The study, published in The Lancet in May 2016, showed that vaginal progesterone was not associated with a reduced risk of preterm birth or composite neonatal adverse outcomes, and that there was no long-term benefit or harm to children at two years of age. The study was shortlisted for The BMJ Awards 2017 UK Research Paper award and the findings prompted an international review into the use of progesterone for preterm birth treatment. The OPPTIMUM study has highlighted the need to find alternative ways to prevent preterm birth in women at risk, and its results are likely to have slowed down or arrested the trend for widespread use of vaginal progesterone for preterm prevention in UK practice.
Identifying patient experience to improve service delivery

Over the past two years we have worked on ways to nationally collect and understand patient feedback on their experience of participating in clinical research.

Following a limited pilot collection in 2015/16, our Local Clinical Research Networks (LCRNs) across England supported a national survey in 2016/17.

The results showed that nearly 90% of the 3,300 patients who responded had a good experience of participating in clinical research, and 86% would be happy to take part in another research study if it was offered. They also showed that people’s positive experience of research and our staff play a critical role in contributing to the end of the study.

The results will contribute towards the development of a ‘service improvement’ programme based on patient experience of research both nationally and locally.

Providing access to anonymised NHS data for public health research

The CPRD continued to grow its data and services, with a significant increase in the number of GP practices agreeing to contribute anonymised patient data and further development of the datalink’s innovative real world clinical studies offering. Over the year, 200 new public health studies using CPRD data were published, contributing to the evidence base for clinical and drug safety guidance.

CPRD data were used to evaluate the benefit of a national vaccination programme for infant oral rotavirus that was introduced in 2013.

The research showed a 15% reduction in the rate of acute gastroenteritis in primary care and a 41% reduction during months of historically high rotavirus circulation since the vaccine’s introduction. Across primary care, emergency department visits and hospitalisation, researchers estimated an annual NHS saving of £12.5 million since the vaccine’s introduction.

PUBLIC INVOLVEMENT AND PARTICIPATION

We involve patients and the public across all of our work and enable patient participation in research.

Every day the public add value to our work. They help us make decisions on what research to fund. Their insights and experience improve the design of research. They test new treatments and ways of delivering services. As ambassadors for our work they ensure our research is seen by other patients, carers and the wider community.

The NIHR is the only government research funder in the world to support an initiative dedicated to promoting and advancing public involvement in research: INVOLVE. Over the past year, INVOLVE has focused on strengthening our approach to public involvement in the following areas: diversity and inclusion, learning and development, and community and co-production.

KEY HIGHLIGHTS

- This year thousands of patients, carers and members of the public up and down the country helped us to fund the best research. Every one of the 263 research projects and 98 personal career development research awards we funded this year has been reviewed by the public and will be involving them in the work.

- Together with Health and Care Research Wales, the Public Health Agency in Northern Ireland and the Chief Scientist Office in Scotland, the NIHR is developing a set of core standards to improve the quality and consistency of public involvement in research.

- In December 2016, we hosted a workshop to build on recommendations in the Going the Extra Mile report and to broaden and deepen our partnership with the public. We explored developing an NIHR approach to assessing the impact of public involvement on research and using routine data to develop and share our intelligence and knowledge of this impact.

- James Lind Alliance Priority Setting Partnerships (PSPs) were completed in a variety of diseases and conditions, allowing clinicians, patients and carers to identify and prioritise uncertainties in autism, bipolar disease, womb cancer and alcohol-related liver disease. We’ve now completed 50 PSPs since 2007. Another 40 PSPs are underway on issues as diverse as adult social work, cellulitis and psoriasis. An increasing number of these PSPs are being conducted with partners in other countries.

DELIVERING IMPACT

Developing shared decision-making tools in collaboration with young people

Researchers funded by our Invention for Innovation (i4i) Programme have developed a smartphone and tablet app called ‘Power Up’ to support young people to have their say when accessing Child and Adolescent Mental Health Services. With Power Up, young people will be empowered and guided to make shared decisions about all stages of their care.
The researchers worked with young people with experience of using services and their advocates to co-produce the design, content and functions of Power Up, so it directly addresses the support young people want when making shared decisions.

They also invited young people, parents, and therapists to test Power Up and provide feedback through interviews, focus groups and co-production sessions. This feedback was used to make improvements to the app.

This research aims to produce a rigorously evaluated tool to help young people managing long-term mental health issues to understand, structure, and express their preferences and views.

**Patient-led design of products to support musculoskeletal conditions**

The **#DesignforMSK** project at the NIHR Manchester Biomedical Research Centre (BRC), in partnership with Manchester Metropolitan University and Manchester School of Art, brought people with musculoskeletal conditions together with designers to create prototype products that could improve their daily lives.

Over a five month period, several workshops were held in Manchester cafés with four product designers, 15 young patients, three public involvement and engagement practitioners, and three researchers from the BRC. The group worked together to explore issues faced by young patients, potential design solutions, and how products could become a reality.

This was followed with a patient-led design process resulting in eight product prototypes, from adaptable bag straps and fashion-statement joint supports to a set of musculoskeletal emojis. The prototypes were showcased in an exhibition, #DesignforMSK: the Invisible (Visible), at Manchester Art Gallery in December 2016.
EXTENDING OUR REACH

2016 marked a decade since the NIHR was established. Throughout the past 10 years we have contributed significantly to the health and wealth of the nation and are now the most comprehensive research system in the world.

To celebrate we held an NIHR at 10 conference in May 2016, with keynote speeches by the Secretary of State for Health, Jeremy Hunt MP; the Chief Scientific Adviser, Professor Chris Whitty; and the Chief Medical Officer, Professor Dame Sally Davies.

We also launched the report ‘An impact synthesis: 100 Impact Case Studies’ by RAND Europe, a collection of examples of what has been achieved in our first 10 years.

In addition, the NIHR School for Primary Care Research held an event in November to mark its 10th birthday. The programme of presentations and discussions highlighted the evidence base provided by the school to date, as well as promising future research.

Bathing adaptations in the homes of older adults

A study being carried out by the Department of Rehabilitation and Ageing at the University of Nottingham, funded through the NIHR School for Social Care Research, is exploring whether it is possible to carry out a randomised controlled trial (RCT) of bathing adaptations for older adults and their carers. The involvement of service users and the local council in the BATH-OUT study has had a significant impact on the shape of the research, recruitment, and the smooth running and delivery of the study.

Tony, an Adaptations and Renewal Manager for Nottingham City Council, and Stuart, a service user who has had an accessible shower installed, are co-applicants on the study. They attend regular research project meetings and contribute to and comment on project reports, journal articles and presentations. They are also members of the research advisory group, which has two additional service users who are also members of Nottingham City Council’s service user group.

“The team gave me a voice, made me feel important and worthwhile from the start. I come to meetings knowing that I am in safe hands and that I can speak up fully. Being involved in the recruitment of the research assistant was a highlight for me”.

Stuart, Patient and Public Involvement (PPI) representative

“As far as we are aware this is the first RCT of housing adaptations in the UK and so we were very interested in being involved as we felt that it was important to do some high quality research on adaptations. This is also the first significant major research that Nottingham City Council has been involved in. We have always been keen but needed to be in partnership with the medical school to make it work.”

Tony, Adaptations and Renewal Manager, Nottingham City Council
STRENGTHENING OUR MEDIA PROFILE

We stepped up our communications activities this year to share the findings of the research we fund and promote our work more widely. This included launching a press office in January 2017 to work more closely with the media.

NIHR-funded research continued to make a splash in the media in 2016/17.

- The ProtecT trial, funded by our Health Technology Assessment (HTA) Programme and published in the New England Journal of Medicine (NEJM), found that active monitoring of men with localised prostate cancer is as effective as surgery and radiotherapy in terms of survival at 10 years. The results of this study were reported in national and international media including by the BBC, the Guardian, the Times, the Financial Times, BBC Radio 2, the Washington Post, the New York Times and the BMJ.

- Surgeons supported by the NIHR Oxford Biomedical Research Centre performed the world’s first robot-assisted eye operation. In the Robotic Retinal Dissection Device (R2D2) trial, surgeons used a remotely controlled robot to lift a membrane a 100th of a millimetre thick from the retina and restore the patient’s sight. The story was covered extensively by the BBC, as well as by ITV, the Guardian, the Mirror, the Daily Mail and the Telegraph.

IMPROVING OUR DIGITAL PRESENCE

We improved our digital presence, to better communicate with and engage our stakeholders.

- We relaunched and refreshed our website to create a single destination for information about the NIHR. The website is organised into nine knowledge areas, with news and features showcasing our research and participants’ experience of research.

- We increased the frequency of the NIHR blog, to share more stories of our people talking about their involvement in research.

- We made it easier for people to get regular updates on our work by streamlining our email newsletters into four areas with a single sign-up process. By the end of March, our newsletters had 10,271 subscribers.

- We delivered our Improving Healthcare Through Clinical Research Massive Open Online Course (MOOC) two more times. During the year, 9,781 people from all over the world took part, bringing the total number of people to have registered for the free, online course to 18,581.
RECOGNISING EXCELLENCE

We continued to support a number of research performance awards, including the Health Service Journal Awards 2016 (Clinical Research Impact), the Nursing Times Awards 2016 (Clinical Research Nurse) and the 2016 Cancer Research Excellence in Surgical Trials (CREST) award. The awards recognise and reward the inspirational work that is taking place across the NHS to make clinical research a core activity. This year’s winners included South Tyneside NHS Foundation Trust, University Hospitals of North Midlands and the Mermaid Centre Surgical Research team at Royal Cornwall Hospital.

We also supported the inaugural Research Champion award at this year’s Advancing Healthcare Awards. The award, co-sponsored with Health Education England (HEE), celebrates research champions among allied health professionals and healthcare scientists who currently hold or who have recently completed an HEE/NIHR Integrated Clinical Academic programme award. The first winner was consultant physiotherapist Dr Lisa Roberts from University Hospital Southampton.

ADDING VALUE IN RESEARCH

Our work to minimise waste and increase value in medical research has received international recognition. We were awarded first prize from Cochrane-REWARD, with the award ceremony taking place at the 5th World Congress on Research Integrity in Amsterdam. This work was also commended in a letter to the Lancet.

We are internationally recognised as an innovative and world leading organisation committed to adding value in research to maximise the potential impact of research that we fund for patients and the public. We played a pioneering role in the creation of the Adding Value Funders Collaboration and Development Forum, with the US Patient-Centred Outcomes Research Institute (PCORI) and the Netherlands Organisation for Health Research and Development (ZonMw) joining us as co-convenors.

PROMOTING OUR CAMPAIGNS

We delivered a number of campaigns throughout the year that were designed to increase awareness of and encourage involvement in research.

Health research has two sides and one of them is you.

Let’s make healthcare better!
Patients, carers, everyone can share ideas for new research, participate in studies, comment on project applications and much more.
It doesn’t take much time to make a difference.

OK to ask about clinical research

Find out how you can get involved in research.
www.nihr.ac.uk/twosides

Healthcare has two sides and one of them is you.

OK to ask about clinical research

Find out how you can get involved in research.
www.nihr.ac.uk/twosides

Right to the point

Cutting edge research, or conventional treatments, the right information at the right time can make all the difference. No more worry about further surgery and treatments.

Patients, carers, everyone can share ideas for new research, participate in studies, comment on project applications and much more.
It doesn’t take much time to make a difference.

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Find out how you can get involved in research.
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## FINANCIAL SUMMARY
### NIHR FUNDING FOR 2016/17

<table>
<thead>
<tr>
<th>AREA</th>
<th>SPEND (£M)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research programmes</strong></td>
<td>242.0</td>
</tr>
<tr>
<td>Translational Research Collaborations</td>
<td>4.7</td>
</tr>
<tr>
<td>Healthcare Technology Co-operatives</td>
<td>2.0</td>
</tr>
<tr>
<td>Diagnostic Evidence Co-operatives</td>
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</tr>
<tr>
<td>MRC/NIHR National Phenome Centre</td>
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<tr>
<td>Other (including dementia and Child Prosthetics)</td>
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</tr>
<tr>
<td><strong>Infrastructure total</strong></td>
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</tr>
<tr>
<td><strong>Faculty trainees</strong></td>
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<tr>
<td>Translational Research</td>
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<tr>
<td><strong>Total revenue spend</strong></td>
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<tr>
<td><strong>Other spend</strong></td>
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<tr>
<td>NIHR contribution to Genomics England</td>
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<tr>
<td><strong>Total NIHR spend excluding Official Development Assistance</strong></td>
<td>1,031.7</td>
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<tr>
<td><strong>Overseas Development Assistance (ODA)</strong></td>
<td>4.1</td>
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<tr>
<td>Joint Global Health Trials Initiative</td>
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<tr>
<td>Other</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total ODA</strong></td>
<td>4.1</td>
</tr>
<tr>
<td><strong>Total NIHR spend including Official Development Assistance</strong></td>
<td>1,035.8</td>
</tr>
</tbody>
</table>

### Research programmes
- Health Technology Assessment: 72.8
- Health Services Delivery & Research (previously HSR & SDO): 22.1
- Programme Grants for Applied Research: 30.2
- Research for Patient Benefit: 16.1
- Invention for Innovation: 12.8
- Public Health Research: 11.1
- Systematic Reviews (Cochrane and TARs): 15.5
- Horizon Scanning: 1.9
- Schools: Primary Care, Public Health and Social Care Research: 12.2
- Methodology: 1.0
- INVOLVE: 0.9
- Health Innovation Challenge Fund: 7.0
- Health Protection Units: 10.7
- Other, including legacy programmes and management not attributed to specific programmes: 27.7

### Infrastructure
- Research Capability Funding: 79.9
- Clinical Research Network: 309.0
- Biomedical Research Centres: 139.1
- Biomedical Research Units: 26.1
- Patient Safety Translational Research Centres: 3.0
- Clinical Research Facilities: 23.2
- Experimental Cancer Medicine Centres: 3.2
- Collaborations for Leadership in Applied Health Research and Care: 26.0
- Excess Treatment Costs: 0.4
- Research Design Service: 10.2
- BioResource: 2.3