



Oxford AHSC Annual Report

2015/2016



Department
of Health

**DEPARTMENT OF HEALTH DESIGNATED
ACADEMIC HEALTH SCIENCE CENTRE (AHSC)**

2015/16 ANNUAL REPORT

Note: Please note this form should be completed in font no smaller than 10-point Arial.

1. ACADEMIC HEALTH SCIENCE CENTRE DETAILS

Name of the Department of Health Academic Health Science Centre:

Oxford Academic Health Science Centre

Contact details of the DH AHSC lead to whom any queries and feedback on this Annual Report will be referred:

Name: Diane Hilson

Job Title: AHSC coordinator

Address: Joint Research Office, Oxford University Hospitals NHS Foundation Trust, The Churchill Hospital

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2. OVERVIEW OF ACTIVITIES (no more than 4 pages)

All partners are coordinating their organisations' master plans, with a particular focus on the relationships across Headington to ensure the best possible placement and plans for clinical services, staff, teaching and research facilities. The work is also being taken forward with Oxford City Council and the CCG. OUH has been developing its strategic vision, focusing on alignment and partners have been actively engaged in this work which will continue throughout 2016. The key areas are: Closer to home; Focus on excellence; Go Digital; and The Master Plan. OUH and OH are working particularly closely on Closer to Home (and with the CCG) so that all aspects of primary and secondary care can be covered and developed. The Oxford AHSN has a key role to play in a number of these areas and is actively involved. The AHSC Board has been involved in the development and oversight of two BRC bids - one (a renewal) the partnership between OUH & UoO, and the second - a new bid from OH & UoO. Many of the AHSC's Theme leads are actively involved in the bids. BRC bids require a partnership between one NHS body and one University, but OBU has been actively involved in the bid process through discussions at the Board and the BRC Steering Group. A renewal bid for NIHR funded CRF is underway in collaboration across the AHSC. It is intended to cover Neuroscience, Stroke and Vascular Dementia, and neuro-imaging across distributed facilities. Greater integration and activity with OBU is part of the proposal. The AHSC is developing its 'digital Road Map' and all partners are being consulted on proposals to integrate and deliver an appropriate e-Health informatics platform. This work will continue with all partners, the CCG, the STP and the Council.

Theme 1: Big Data delivering the digital medicine revolution: Build of £47M Big Data Institute proceeds on-target and within budget; a "topping-out" ceremony was held at the end of February and it is due to be completed in late 2016, with BDI academic activity in nearby buildings in the interim. It will host 500-600 data scientists with expertise in acquisition, processing and analysis of genomic (and other 'omics), imaging, sensor, patient-reported and routine clinical (EHR, registries) data, and will be an analytical hub that is central to all Themes. In the past year, senior scientists have been recruited to the BDI in the areas of statistical genetics, infectious disease surveillance, facial image analysis (for rare diseases), activity monitor analysis, ethics and information governance. The AHSC Big Data & Clinical Informatics committee, chaired by Prof Landray, provides scientific coordination of activities across all partners (including the current BRC). Examples include the development of an integrated, longitudinal research record and data warehousing infrastructure for cancer and microbiology translational research; the delivery of the Oxford NHS Genomic Medicine Centre and of software infrastructure to support large-scale clinical genomic research (including linkage to national datasets, such as HES) for the 100k Genomes Project; coordination and provision of data models of the Health Informatics Collaborative across 5 BRCs; the development of a clinically-validated smartphone-based system for the management of gestational diabetes (now used in 5 NHS Trusts); the development of an evidence-based early-warning score system deployed on all the wards of the region's acute hospitals; a patient-centric tablet computer intervention for management of chronic obstructive pulmonary disease; the generation and release of large, novel datasets for UK Biobank (including 70 million imputed genetic variants, 7-day activity monitors, and web-based cognitive function assessments each on subsets of >100,000 participants; and linked coded data on hospitalisation, cancer and death for all 0.5 million participants). The team contributed to the design and delivery of the national MISG Health Data Finder programme and the development of a portal that provides information on HIC datasets alongside resources provided by HSCIC, CPRD, and PHE.

Theme 2: Building novel NHS, University and Industry Relationships Progress has been strong and work has been led in collaboration with the Oxford AHSN: i) **The BioEscalator:** The final form of the BioEscalator has been agreed and the build is going forward. Construction has already started with availability of physical space scheduled for Autumn 2017 - on target. ii) **New collaborations:** £20 million+ of collaborative research funding has been secured through strategic relationships with Bayer, Merck, Novo Nordisk, Pfizer and UCB. Since the inception of the AHSC a number of these partnerships have been significantly expanded partnerships have secured an additional £8 million in funding while the additional partnerships have been signed. This work stream is currently on track to meet the Theme objectives. iii) **Creation of new SMEs:** A number of spin-outs have been created during the AHSC timeframe (see Annex 2.) iv) **Establish a new Open Innovation Platform:** The expansion of the Open Innovation Platform at the SGC continues apace through new investment and collaborations. Work to date has focused on a number of areas: a) Exploring the factors that influence the pre-competitive boundary between open and closed research, and how this pre-competitive pathway could be moved from the research stage to early clinical trials. This includes an assessment of the health benefits and costs of such a shift. We have engaged with a number of key influencers including the Chief Economist at the Bank of England. b) The Oxford Martin School has invited us to submit a proposal on 'Charting through a nascent, more efficient, sustainable and inclusive ecosystem in drug discovery for the benefit of future generations' to further explore the factors that could influence the adoption of Open Innovation more broadly. Potential funding for this study will be £1.5 million. c) Consideration of other open access disease platforms, including antimicrobial resistance.

Theme 3: Modulating immune response for patient benefit: An **Oxford wide** Immunology Theme for co-ordination of internal efforts and interface with industry has been created. Funding received from UoO (John Fell fund) and links made with UCB, Celgene, GSK and Roche. Development of programmes for vaccines against infectious diseases including rapid development of a new vaccine for Zika virus (Prof. Adrian Hill, OUH).

This has been coupled with new efforts to develop virus sequencing approaches focused on Zika now funded through the MRC Rapid Response call (Prof D Crook and Prof P Klenerman OUH). A new large trial of a preventive vaccine for Respiratory Syncytial Virus (RSV) (Dr M Snape) with GSK now completed recruitment, and new trials for Typhoid vaccines continue with support from the Gates Foundation and the EU (Aditec). A new study with STOP-HCV (£4m MRC funded strategic medicine initiative, centred in Oxford) and EME to trial short course therapy for HCV with novel agents. Development of new treatment approaches for allergy (Prof G Ogg) in collaboration with Atopix and new trials for treatment of severe asthma with Atopix (Prof I Pavord). Development of new ROR-gamma inhibitors for inflammation with ORCA is underway (Dr L Xue). The lead compounds co-developed were taken on by Astra Zeneca UK and Brickell USA. Discovery of new mechanism and development of a potential therapy for improving function of ageing lymphocytes, relevant to vaccination (Prof K Simon). An Oxford event was held to develop innovations in immunotherapy with Industry (www.oxford.inno-forum.org)

Theme 4: Managing the epidemic of chronic disease - strategically, the Theme has positioned itself as a facilitator of collaborative research on the management of chronic disease and its acute complications across the partners. The development and evaluation of innovative technologies to improve care has evolved as a core component. In this regard, the planned scale-up in access to Electronic Health Records will be pivotal in achieving our goal of providing integrated digitally-guided clinical decision support. In collaboration with the Oxford AHSN's Director of Informatics, the theme has established the foundation for an EHR-linked system that will provide real-time evaluation of an individual's disease risks and personalised guidance for clinical decision making. Major competitive funding has been secured for projects evaluating innovative approaches to chronic disease management using digital monitoring technologies and associated electronic disease management systems. At a different level, a large programme of work has focused on innovative approaches to the management of dyspnoea, one of the most common symptoms of chronic disease. This has included the use of deep brain stimulation for the management of this condition and several others including chronic pain and Parkinson's Disease. Another core component evolving is clinical informatics using big data. This has involved a range of projects focused on the management of common chronic conditions in hospitals and general practice in the UK. Initial analyses have generated important findings: for example, differences in treatment patterns for men and women with diabetes have been documented, as have large variations between regions in heart failure outcomes only a small fraction of which could be attributed to differences in hospital care. Another major big data programme (the Deep and Frequent Phenotyping Study) involving a range of partners is focusing on the analysis and interpretation of data on digital biomarkers for early detection of dementia and monitoring of cognitive changes. Finally, a new initiative with Stanford University is the Oxford Biodesign Programme, which has been designed to train the next generation of leaders in medical technology innovation. One major focus of this will be the development and commercialisation of innovative digital technologies for the prevention and treatment of chronic diseases. Building on all these achievements, Theme 4 investigators have now started to focus their attention on the major issue of multi-morbidity and the management of co-morbidities, which affects the large majority of adults presenting with any common chronic condition. Work has already begun on the management of co-morbid psychological and physical conditions (e.g. depression and cancer) and multiple physical conditions (such as heart and lung disease).

Theme 5: Emerging Infections and Antimicrobial Resistance The Epidemic diseases Research Group Oxford (ERGO) led by Professor Peter Horby, is successfully running the Rapid Assessment of Potential Interventions and Drugs for Ebola (RAPIDE), a UoO led clinical trial run in West Africa to UK standards. Using the unique RAPIDE trial platform, ERGO successfully ran two clinical trials in West Africa where potential therapeutic drugs were prioritised and examined for their effectiveness to treat Ebola. The trials involved successful collaborations with research and health officials in West Africa and many NHS trusts and Universities both in the UK and worldwide which enabled the deployment of over forty qualified healthcare workers to assist with the UoO led trial. The collaborations between UoO, OUH, West African authorities and NGOs provided a platform for the unprecedented rapid turnaround and assessment for the clinical trials of two experimental drugs to treat Ebola (Brincidofovir in Liberia and TKM-130803 in Sierra Leone). The data from the RAPIDE studies are available for researchers to download (<http://www.iddo.org>). A workshop was convened following the clinical trial to enhance and build upon the collaborations and learning experience of the trial. All staff involved in the trial were presented by the Vice Chancellor of UoO with UK Ebola Medals for Service in West Africa or UoO Ebola medals. ERGO also collaborated with the Institute of Tropical Medicine in Antwerp and many other worldwide collaborators to examine the usefulness of convalescent plasma to treat Ebola patients in Guinea. ERGO is a member of a team of academic collaborators (which includes the London School of Hygiene and Tropical Medicine and Kings College London), to work with Public Health England and the DH to run a UK Rapid Support Team. This team will investigate and respond to disease outbreaks and provide specialist recommendations to national and international stakeholders, drawing on rigorous evidence in Official Development assistance (ODA) eligible countries while building capacity for outbreak response and strengthening local capacity to meet international health regulations. This new initiative will run for five years and build upon the expertise acquired within ERGO and UoO to investigate epidemics. Bringing all of these elements together ERGO are also working closely with WHO to both provide tools to empower and provide professionals based in Low and Middle Income Countries the tools to set up and run successful, robust studies

in their healthcare settings. The training will be freely available through the already available and successful UoO teaching site (<https://tghn.org>) and will provide expert teaching on subject areas such as planning, methodology, study design, ethics, data management and communications. Collaboration and engaging academic, healthcare providers and funding bodies are paramount to the successes of ERGO. ERGO is part of the Platform for European Preparedness Against (Re-)emerging Epidemics (PREPARE) network, a clinical research network established with European Union funding. The group based in the UoO is running two prospective observational studies on infections with epidemic potential in Europe: the Multicentre European study of Major Infectious Disease Syndromes (MERMAIDS) which will examine acute respiratory infections in adults, arbovirus compatible febrile illnesses in adults and community acquired sepsis-like syndrome and paediatric acute respiratory infections in infants and children. These studies began in 2015 and will run until 2018. (for additional information please see Annex 2)

Theme 6: Cognitive Health: Maintaining Cognitive Function in Health and Disease

Dementia/neurodegeneration research is a major strategic priority for UK government and continues to be a growing strength at Oxford. The pace of the development of dementia research in Oxford continues to accelerate with Oxford leading further national and international initiatives, with over £150m funding (including to collaborators) include: A) Dementias Platform UK (MRC, <http://www.dementiasplatform.uk/>) - Director, John Gallacher. The DPUK was established by the Medical Research Council (MRC) in June 2014 and is a £53 million collaboration between universities and drug companies to transform the best dementia research into the best treatments as quickly as possible. B) UK Translational Research Collaboration in Dementia (NIHR) established to pull discoveries from basic science into real benefits for patients – Director: Simon Lovestone. C) ARUK UK Oxford Drug Discovery Institute (<http://oxford-ddi.alzheimersresearchuk.org/>) – Directors: Profs Bountra & Lovestone. The DDI is uniting collaborative efforts for target identification with sophisticated target development capabilities and is one of three Institutes within the Alzheimer's Research UK Drug Discovery Alliance, working alongside Institutes at Cambridge and UCL. The Alliance will accelerate the discovery of novel, effective therapeutics for Alzheimer's disease and other neurodegenerative diseases. Oxford's approach to dementia and neurodegeneration brings strengths from other areas including immunology (Sir Marc Feldman), oncology and metabolism. D) Oxford Parkinson's Disease Centre – Director: Richard Wade Martins. The OPDC is a unique multidisciplinary research centre at the University of Oxford supported by Parkinson's UK with funds from The Monument Trust. It brings together internationally-renowned scientists who work on the genetics of Parkinson's, the generation of cell and animal models, and the wiring of brain circuits which control movement, with clinical experts in the diagnosis and treatment of Parkinson's and was recently awarded second phase funding (2015-2020). E) Innovative Medicines Initiative grants led or co-led at Oxford including EMIF and EPAD – Prof Lovestone. F) Other Oxford-based world leading research in Motor Neurone Disease (Kevin Talbot), Vascular brain disease (Peter Rothwell), Multiple Sclerosis (Lars Fugger) and developing strengths ranging from basic neuroscience, stem cell biology and chemistry, through imaging, informatics and large cohort studies to drug discovery and development including clinical trials. The Oxford Institute for Human Brain Activity has completed a £5 million upgrade and now has class leading MRI (Siemens Prisma 3T) alongside magnetoencephalography (MEG). This upgrade is the first phase of the development of the Warneford site as a centre for translational neuroscience. This development will create a Brain Health Centre with co-location of cutting edge translational human neuroscience and patient care. The Theme has achieved another of its strategic priorities by building capacity on nursing research by coordinating the resources of the CLAHRC, OBU, UoO and the two NHS Trusts. In collaboration with the Oxford Institute of Nursing and Allied Health Research, the NIHR Oxford cognitive health Clinical Research Facility has recently recruited a Senior Nursing Research Fellow.. This position combines clinical academic research and teaching with the lead role on the CRF.

In recognition of the improvements in **inter-Professional Education** between AHSC partners – Clair Merriman (OBU), K. Metcalfe & S. Thompson (UO), and G. Alg, L. Wright, S. Wheeler & J. Beale (OUH) facilitated a successful pilot which was supported by HEETV which looked at Inter-Professional Education partnering and effective ways of teaching geriatric medicine to medical and nursing students. This work is expanding to all nursing and medical students with continued support from HEETV, with the goal to also include other branches of nursing. Collaboration continues on the programme where medical and adult nursing students use the simulation facilities at **OxStar and Kadoorie** to improve patient care locally through simulated emergencies training, where students are supported in technical and non-technical skills such as human factors, team working, and situational awareness. This pilot was well received, scenarios have been expanded and other NHS Trusts have been in contact for training. **Sir Jonathan Michael** retired as CEO of OUH in October 2015 (he played a major role in designation of the AHSC). Dr Bruno Holthof, now CEO, has taken an active role in the work of the AHSC and involved partners in key areas that play to the strategic objectives of the AHSC. The OUH became an FT on 1 October 2015. Apart from this the Board of the AHSC remains unchanged, chaired by Sir John Bell. The CEO of the Oxford AHSN and the R & D Directors attend Board meetings ensuring close collaboration and understanding across the AHSC and the Oxford AHSN. The Board has appointed a senior manager to direct the AHSC reporting to the Board (April 2016).

This form must be submitted, by e-mail, no later than **1pm Friday 6 May 2016** to Jasmine Parkinson (jasmine.parkinson@nihr.ac.uk). Please feel free to provide any other information you wish (in a separate annex) that demonstrates the progress made with your AHSC in 2015/16.

The Annual Report aims to capture progress against the stated objectives, specific themes and work programmes as set out in your application, in order for the Department of Health to be able to understand the overall progress of the AHSCs. However, please note that we will not be providing feedback on the AHSC Annual Reports.

A signed copy of this report should be sent no later than **13 May 2016**, to:

Dr Jasmine Parkinson
NIHR Central Commissioning Facility
Grange House
15 Church Street
Twickenham TW1 3NL

OBU Oxford Brookes University
UoO University of Oxford
OH Oxford Health NHS Foundation Trust
OUH Oxford University Hospitals NHS Foundation Trust

Annex 1: Oxford AHSC

The Oxford AHSC has accomplished a successful second year. The AHSC Board of partners has met on five occasions during 2015/2016 to oversee the delivery of the themes and integration of high quality research, clinical care and education as set out in the strategy agreed by the four partners. The group has received reports on progress with the themes, specific updates in relation to; for example PPI, and updates on steps being taken to further integrate research, education and patient care.

The Centre will continue to make progress into 2016/17, combining the institutions' individual strengths in world-class science, research, training and clinical expertise to address 21st healthcare challenges. In particular, it will continue to support the shortlisted BRC bids from Oxford University Hospitals and the University of Oxford and Oxford Health and the University of Oxford.

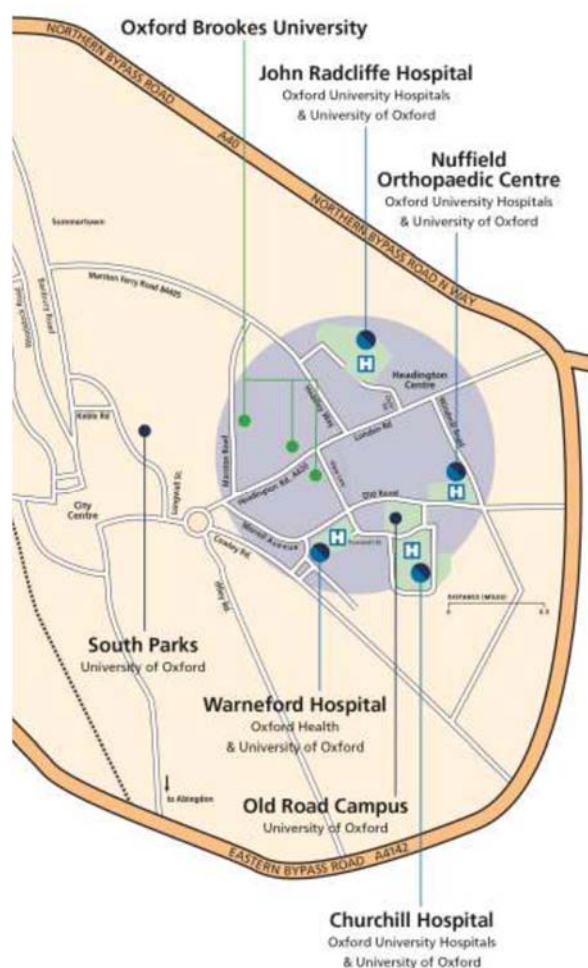
The Partners are:

Oxford Brookes University

Oxford Health NHS Foundation Trust

Oxford University Hospitals NHS Foundation Trust

University of Oxford



Board membership

Chairman: Professor Sir John Bell, GBE, Regius Professor of Medicine, University of Oxford

- Professor June Girvin, Pro Vice Chancellor and Dean of the Faculty of Health and Life Sciences, Oxford Brookes University
- Mr Stuart Bell, CBE, Chief Executive, Oxford Health NHS FT
- Dr Bruno Holthof, Chief Executive, Oxford University Hospitals NHS FT (from 5 October 2015)
- Sir Jonathan Michael, Chief Executive, Oxford University Hospitals NHS FT (to 2 October 2015)
- Professor Alastair Buchan, Dean of the Medical School and Head of Medical Sciences Division, University of Oxford

In attendance:

- Professor Keith Channon, Director of BRC, Director of R&D, Oxford University Hospitals NHS FT and University of Oxford
- Professor John Geddes, Director of R&D, Oxford Health NHS FT and University of Oxford
- Professor Linda King, Pro Vice Chancellor, Research and Global Partnerships, Oxford Brookes University
- Professor Gary Ford, CBE, Chief Executive Officer, Oxford Academic Health Science Network

Management and administrative and support is currently provided by Megan Turmezei and Diane Hilson. Current Partner Ambassadors include Dr Ryan Pink, Oxford Brookes University. A Senior Manager has been appointed to direct the activities of the AHSC reporting to the Board.

Theme Leads

Theme 1: Big Data: Delivering the Digital Medicine Revolution **Professor Martin Landray**

Theme2: Building Novel NHS, University and Industry Relationships **Professor Chas Bountra**

Theme 3: Modulating Immune Response for Patient Benefit **Professor Paul Klenerman**

Theme 4: Managing the Epidemic of Chronic Disease **Professor Stephen MacMahon and Professor Kazem Rahimi**

Theme 5: Emerging Infections and Antimicrobial Resistance **Dr Peter Horby**

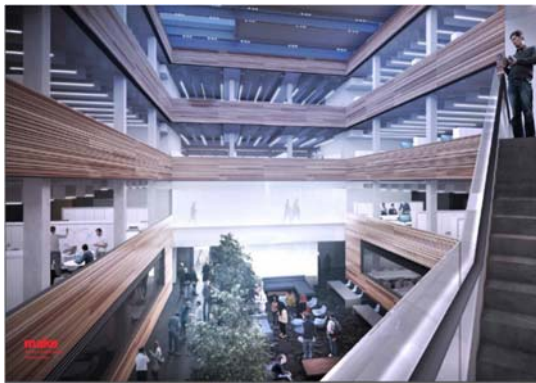
Theme 6: Cognitive Health: Maintaining Cognitive Function in Health and Disease **Professor John Geddes**

Annex 2: Additional information on Themes and other developments**AHSC Theme 1: Big Data delivering the digital medicine revolution**

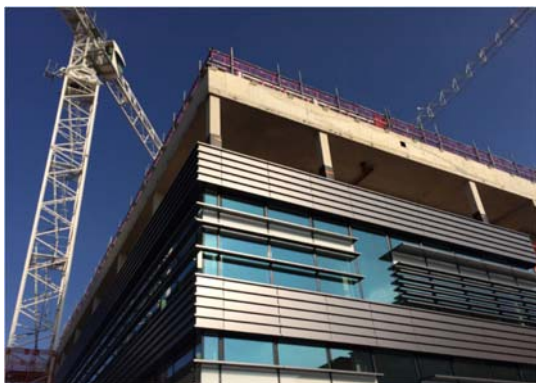
Construction of the Big Data Institute (BDI): The construction of the BDI is currently on budget and on schedule for handover to the University in November 2016. Staff will start moving into the BDI in phases from January 2017. The construction is being undertaken by Mace Ltd, working to a 100-week construction programme. A full-time Buildings and Facilities Manager has also been recruited to assist successful completion. The traditional ‘topping out’ ceremony was held on 26 February 2016 to mark the final roofing piece being in place, an important milestone in the construction.

The concrete frame is now complete and the unitised external cladding is being installed. Mechanical and electrical installations have also begun. Discussions are on-going between the University and Mace on the proposed internal fit out and finishes. These are progressing well. The next key milestone is to make the roof and whole building watertight in May 2016.

The building was designed by Make Architects and we are pleased that it has been shortlisted for the Buildings & Energy Efficiency awards for innovation.



Architect's impressions of the Big Data Institute atrium



Construction work on upper levels and façade of the Big Data Institute (Feb 2016)

AHSC Theme 2: Building novel NHS, University and Industry relationships

Progress has been strong and work has been led in collaboration with the Oxford AHSN (Dr Nick Scott-Ram) : i) **The BioEscalator:** The final form of the BioEscalator has been agreed and the build is going forward. Construction has already started with availability of physical space scheduled for Autumn 2017 – on target. ii) **New collaborations:** Over £20 million of collaborative research funding has been secured through strategic relationships with Bayer, Merck, Novo Nordisk, Pfizer and UCB. Since the inception of the AHSC a number of these partnerships have been significantly expanded (for example the UCB and Novo Nordisk) partnerships have secured an additional £8 million in funding) while the following additional partnerships have been signed (Corporate: Janssen China, Celgene, Johnson and Johnson; SMEs: Abide Therapeutics, SomaLogic). This workstream is currently on track to meet the Theme objectives. iii) **Creation of new SMEs:** A number of spin-outs have been created during the AHSC timeframe

Year	No of spin-outs	Companies	Total Raised
2014	5	NightstaRx, Genomics, Oxsonics, Deontics, OxSyBio	£59M
2015	6	iOx, Xerion Healthcare, OxEML, Navenio, Orbit Discovery, Oxford Endovascular	£7.6M
2016	3 to date, 6+ pending	Zegami, Vaccitech, OMass, Oxstem, Oxford Nanolmaging, EvOx, Argonaut, OcuLab, Oxford Impedance Diagnostics	£11.5M to date

The key points to note are:

- 14 new companies developing medical technologies created since AHSC inception.
- £78.1 million of seed and follow on investment raised by these companies
- 6 additional medical sciences companies have offers of investment and are expected to complete formation this financial year
- 20+ further medical sciences companies in the pipeline
- On track to significantly exceed AHSC target of 15 in 5 years from Oxford University alone
- OSI has unquestionably had a catalytic effect and increased interest from wider investment community.

Bicester Healthy Towns Project – Bicester has been designated as one of ten national healthy town sites by NHS England. The core partners (Cherwell District Council, Oxfordshire CCG, the developer A2 Dominion and the Oxford AHSN) were strongly supported by the AHSC organisations and other collaborative partners (including, Age UK, Isis Innovation, HETV). This is a five-year initiative to improve health through built environment in the local area and will pilot with 393 eco homes in Bicester. The project will focus on improved public health initiatives, covering integrated healthcare technologies, digital interactive tablet systems in the home, public data and patient activated technologies. The final development will comprise around 13,000 new houses. Oxford Brookes University is holding the initial development workshops in collaboration with the AHSN.

Theme 3 – Modulating Immune Response for Patient Benefit

Close collaborations have been formed with SOMAlogic, aiming to locate a base in Oxford. This includes development of screening programmes to define biomarkers for inflammatory diseases based around local cohorts (e.g. inflammatory bowel disease/liver disease; Dr Alessandra Geremia (UoO), funded through an overarching collaborative agreement. The new Immunology theme is also developing links with GSK, Celgene and UCB looking to fund or currently funding translational projects

based around local inflammatory disease cohorts (Prof P Bowness UoO, Prof P Klenerman UoO). Other local industrial collaborations from within this programme have actively been pursued including those with Atopix (clinical trials of CRTH2 antagonists for severe allergic skin and lung disease; Prof G Ogg and Prof I Pavord UoO), ORCA (preclinical development of ROR γ T inhibitors; Dr Luzheng Xue UoO) and Immunocore.

AHSC Theme 4: Managing the epidemic of chronic disease – 2015/2016 report

Theme 4 plays a central role in the AHSC as understanding and management of chronic conditions across the AHSC partner organisations. Both at strategic and operational levels substantial progress has been made. The theme leaders have worked with several groups across the AHSC network to refine the shorter and longer term strategy of the theme and to create opportunities for accelerated progress. Although this will be an ongoing process, the following key strategic objectives were developed:

Short-term objectives:

- To understand risk of clinical deterioration and patterns of care delivery in patients with chronic conditions with use of research datasets as well as large-scale routine healthcare records
- Design, implement and evaluate an IT-facilitated care delivery models and evaluate one major chronic condition (heart failure)
- Develop a transparent, open and collaborative governance structure that leverages synergies within and outside of the network

Longer term objectives:

- Expand the programme to management of other major chronic conditions and patients suffering from multiple chronic disease
- Use live clinical datasets to support point-of-care clinical and managerial decision making
- Evaluate implications on workforce training and business models

At the research level, Theme 4 has been leveraging opportunities across the AHSC (Big Data and Cognitive Health themes), the Oxford AHSN (Informatics), BRC (Primary Care and Prevention, Stroke and Dementia, Bioinformatics), NIHR CLAHRC, UO, OBU and the NHS Trusts. It would not be possible to cover all activities from the past year in this short report. Instead, we are providing a few highlights that show the depths and breadth of activities.

The cardio – respiratory research group at OBU (Dr. Shakeeb Moosavi, Dr. Jo Grogono and Dr. Helen Walthall) has made substantial progress to understand chronic respiratory symptoms and their management. The experimental phase of a study comparing the effect of inhaled furosemide on different types of induced dyspnoea in healthy individuals is complete. Preliminary analysis suggests that ‘air hunger’ an unpleasant component of clinical dyspnoea is relieved more than the sense of breathing effort. This data may account for the variable benefit that inhaled furosemide has been reported to have in patients with intractable dyspnoea and may offer a targeted approach to treatment of dyspnoea in chronic disease. A follow-up study of 12 advanced heart failure patients is underway and a larger randomised double-blind crossover clinical trial of 40 heart failure patients in the community is expected to start this summer. In another project, several patients with deep brain stimulation for relieve of chronic pain, Parkinsonian tremor or dystonia have now been studied. In this patient stimulation of certain thalamic nuclei abolished his existing dyspnoea. When retested, relief was possible from stimulation of additional electrodes. This data has been corroborated by studies with experimentally induced ‘air hunger’ in other DBS patients with electrodes in the same nuclei (but without co-existing COPD). Combined with recent findings from functional brain imaging of dyspnoea in healthy subjects and COPD patients by Dr Kyle Pattinson’s group, this data could lead to identification of a neural network for dyspnoea akin to what has been identified for pain perception.

Several Parkinson's patients have also been recruited to follow up on a recent report suggesting that subthalamic nucleus (STN) stimulation leads to increased breathlessness. Development of a Patient Reported Outcome Measure (PROM) for fatigue and breathlessness in Chronic Heart Failure patients has reached the last stage of validation and reliability testing – questionnaires have been sent out to 200 patients, when 110 returns are met final analysis and write-up will begin.

Another strand of work has been focusing on use of biomarkers and big data analysis for dementia research (Simon Lovestone). Working with Stephen Friend from Sage Bionetworks we have established a federation to design and implement digital biomarkers for early detection of dementia and monitoring of cognition in the preclinical phase. Led by Chris Hinds and Simon Lovestone at Oxford this federation includes other academic groups and pharma including Lilly and Roche and has secured over \$1m funding. Digital biomarkers, including streaming data from Android devices and apps for cognition testing will be generated during 2016/17 and then implemented first in the Deep and Frequent Phenotyping study. This MRC funded component of Dementias Platform UK will test very deep phenotyping including EEG, MEG, sMRI, fMRI, PET amyloid, PET tau, optical, gait, activity, and molecular markers in CSF and blood alongside cognition and clinical testing as well as the digital markers generated in the Oxford led federation. Markers will be tested frequently, up to 2 monthly, to identify signals of change in preclinical and prodromal disease'

The Oxford AHSN informatics team (Mike Denis) and SUPPORT-HF research team (Kazem Rahimi) have been working over the course of the year to provision secure access to clinical records data held in primary care and secondary care EPR systems to be linked with data generated directly by consented research participants. The challenges presented in navigating over multiple systems across the health sector has proven difficult resulting in parallel workstreams to support immediate programme requirements by identifying geographic regions in the UK where data interoperability had already been achieved (Northern Ireland, Salford, Birmingham, Hampshire) whilst progressing core AHSC objectives for real time data integration in Oxfordshire. This exploration has included assessment of the potential to support a Personal health record model, in partnership with Patients Know Best (PKB), to ensure Patients/Study recruits are activated to maximise self monitoring and self management opportunities. Oxford plans have developed over the last six months from conceptual design modelling to business case development and investment appraisal. The support heart failure programmes provides an important use case for implementing new clinical service models informed by evidence from research studies. Oxford is now on the cusp of initiating an exciting eHealth interoperability and advanced informatics programme engaging all health and care partners and importantly engaging the university sector, industry and the wider innovator community. The Oxford AHSN has led the development a comprehensive Information Governance framework to provide assurance to both key stakeholder partners and general public/patient groups. The AHSC expects to establish a live innovation and data test bed within 12 months with the SHF programme one its early proof on concept applications.

In parallel to establishing access to live NHS data, the Healthcare Innovation and Evaluation group at the George Institute (Kazem Rahimi and Stephen MacMahon) have been making use of historic large-scale datasets from a range of sources to address important questions relating to the epidemic of chronic disease. This included the analysis of Hospital Episodes Statistics to show that unlike the common belief, the burden of heart failure has been showing similar declines to myocardial infarction in the UK over the past few decades. Another set of analysis has used the National Heart Failure audit data from 170 hospitals in England and Wales to investigate the sources of variation in adherence to evidence-based guidelines and clinical outcomes. A surprising finding from this was that only a small fraction of variability in outcomes was attributable to hospital features, suggesting that additional costly investments in re-organisation of services for heart failure patients is highly unlikely to have any material effects on the existing variation in care. A series of analyses have used the national primary care records of millions of patients registered with their GP to investigate the effect of common risk factors (such as high blood pressure) on a range of outcomes. The scale of the dataset has allowed the

researchers to measure risk associations accurately and to move towards stratified medicine that relies on better understanding of such associations for smaller subgroups of patients. The findings have been published in several high-impact journals and have attracted much media and public attention. In this context, a recent paper that investigated the effect of blood pressure lowering on a range of vascular outcomes has been selected as a finalist in the UK Research Paper of The Year category of The BMJ Awards 2016.

Recognising that co-occurrence of several chronic conditions among individuals (i.e., multi-morbidity) is increasing rapidly, a large body of activity ranging from funding applications over to research projects has been focusing on this domain. For instance, the Oxford Psychological Medicine group (Michael Sharpe) has been started with an implementation study of an evidence-based model of treatment for co-morbid depression in cancer patients in the Oxford Cancer Centre (funded by the NIHR CLAHRC). The groups has also secured a major award for funding from NIHR (approximately £2 million) for a multi-centre trial of proactive liaison psychiatry (instead of the traditional passive referral model) to better manage elderly patients with medical psychiatry comorbidity in medical wards. The overall aim if of the study is to assess the impact of such proactive psychological care on early discharge.

Theme 5: Emerging infections and antimicrobial resistance

Identifying and characterising new infectious threats at source

Emerging infections have been high the University's agenda since 2014/15 with the Epidemic diseases Research Group Oxford (ERGO) led by Professor Peter Horby, successfully running the Rapid Assessment of Potential Interventions and Drugs for Ebola (RAPIDE), a UoO led clinical trial run in West Africa to UK standards. Using the unique RAPIDE trial platform, ERGO successfully ran two clinical trials in West Africa where potential therapeutic drugs were prioritized and examined for their effectiveness to treat Ebola. The trials involved successful collaborations with research and health officials in West Africa and many NHS trusts and Universities both in the UK and worldwide which enabled the deployment of over forty qualified healthcare workers to assist with the UoO led trial. The collaborations between the UoO, OUH, West African authorities and Non-Governmental Organisations provided a platform for the unprecedented rapid turnaround and assessment for the clinical trials of two experimental drugs to treat Ebola (Brincidofovir in Liberia and TKM-130803 in Sierra Leone). The data accrued in the RAPIDE studies are available for researchers to download (<http://www.iddo.org>). A workshop was convened after completion of the clinical trial to enhance and build upon the collaborations and learning experience of the trial at which all of the staff involved in the trial were presented by the Vice Chancellor of UoO with UK Ebola Medals for Service in West Africa or UoO Ebola medals. ERGO also collaborated with the Institute of Tropical Medicine in Antwerp and many other worldwide collaborators to examine the usefulness of convalescent plasma to treat Ebola patients in Guinea.

ERGO is a member of a team of academic collaborators (which includes the London School of Hygiene and Tropical Medicine (LSHTM) and Kings College London), to work closely with Public Health England (PHE) and the Department of Health to run a UK Rapid Support Team (RST). This team will rapidly investigate and respond to disease outbreaks and provide specialist recommendations to national and international stakeholders, drawing on rigorous evidence in Official Development assistance (ODA) eligible countries while building capacity for outbreak response and strengthening local capacity to meet international health regulations (IHR). This new initiative will run for five years and build upon the expertise acquired within ERGO and UoO to investigate epidemics. Bringing all of these elements together ERGO are also working closely with the World Health Organisation (WHO) to both provide tools to empower and provide professionals based in Low and Middle Income Countries (LMIC) the tools to set up and run successful, robust studies in their healthcare settings. The training will be freely available through the already available and successful UoO teaching site (<https://tghn.org>) and will provide expert teaching on subject areas such as planning, methodology, study design, ethics, data

management and communications. Collaboration and engaging academic, healthcare providers and funding bodies are paramount to the successes of ERGO. ERGO is part of the Platform for European Preparedness Against (Re-)emerging Epidemics (PREPARE) network, a clinical research network established with European Union funding. The group based in the UoO is running two prospective observational studies on infections with epidemic potential in Europe: the Multicentre European study of Major Infectious Disease Syndromes (MERMAIDS) which will examine acute respiratory infections in adults (ARI), arbovirus compatible febrile illnesses (ARBO) in adults and community acquired sepsis-like syndrome and paediatric acute respiratory infections (PED) in infants and children. These studies began in 2015 and will run until 2018.

Professor Horby is an active member of the International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC), the Secretariat of which is housed at UoO, ISARIC provides a global collaborative platform where patient-orientated clinical studies can be developed, executed and shared, the group have been collaboratively working on Ebola and Zika virus studies with many academic and health institutes. Professor Horby and ISARIC are members of the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R) which is a network of research funding organisations, the collaboration has the ability to bring funding organisations together and provide funding for re-emerging infectious diseases with pandemic potential. This collaborative group has provided funding essential for recent outbreaks such as Ebola and Zika virus.

Oxford outbreak pathogen vaccine programme / Understanding and controlling animal reservoirs (Hill, Fazakerly)

Research groups at Oxford (Jenner Institute and Oxford Vaccine Group, which together form the Oxford Vaccine Centre) have been actively involved in clinical vaccine development of Ebola vaccines since August 2014, and this activity is still ongoing. Initial work by the Jenner Institute involved a Phase I dose escalation study of GSK's cAd3 EBOZ vaccine which rapidly provided safety data to allow a Phase I trial in West Africa to go ahead. Subsequently the Jenner Institute facilitated manufacturing of a monovalent MVA-EBOZ by Emergent Biosolutions for use in prime boost vaccine regimens. From this series of Phase I trials we now know that the neutralising antibody response to a single dose of cAd3 EBPZ is equivalent to that of the VSV-vectored vaccine that demonstrated high level efficacy in a phase III ring vaccination trial in Guinea during the early summer of 2015. This antibody response is well maintained for at least six months and can be boosted to higher levels by a single dose of MVA. Vaccine regimen optimisation trials revealed that strong immune responses were induced even with only a one week interval between the two vaccinations rather than the standard eight weeks. The rate of fevers among vaccinees was considerably lower for cAd3 ZEBOV than for the VSV-vectored vaccine. OVG worked with J&J and Bavarian Nordic to conduct Phase I trials of their A26.ZEBOV and MVA-BN-Filo in prime boost regimens. Both of these vaccines were also safe and well tolerated with a low rate of fevers and when used in prime boost regimens induced strong immune responses to Ebola virus. All four Ebola vaccines are being tested in further phase II trials in West Africa.

The Jenner institute has developed a MERS vaccine using the Oxford-owned ChAdOx1 simian adenovirus vector. A single dose in mice elicits high titre neutralising antibodies, and arrangements are now being made to test immunogenicity and efficacy in alpacas and camels, through collaborations with the US, Saudi Arabia and Kenya. If the current application for funding is successful this vaccine will enter GMP manufacturing in July 2016 in preparation for clinical trials in the UK in Q1 2017 followed by further Phase I trials in Saudi Arabia.

A ChAdOx1-vectored vaccine against Rift Valley Fever virus has demonstrated complete protective efficacy after a single dose in the three main target livestock species, sheep cattle and goats, as well as a high level of neutralising antibodies in camels. Additionally the ability to thermostabilise the vaccine for storage at temperatures of up to 45 °C with no loss of immunogenicity in livestock has been demonstrated. The outcome of an application for funding GMP manufacture for Phase I clinical trials and further livestock studies will be known by April 20th.

Following an invitation from the WHO the Jenner Institute has presented plans to utilise viral vectored vaccines (simian adenoviruses and MVA) as a platform technology to be able to respond to new threats from emerging pathogens as rapidly as possible. Currently vaccines against Zika, Crimean Congo Haemorrhagic Fever, Ebola Zaire and Sudan, Marburg, Lassa Fever and Nipah virus are all in preclinical development, and we are awaiting funding for the GMP manufacture and Phase I trials of the ChAdOx1-Zika vaccine.

Creating evidence based maps for 174 global pathogens (Simon Hay, Catherine Moyes)

Since the Gates Foundation-funded Atlas for Baseline Risk Assessment for Infectious Diseases (www.abraid.ox.ac.uk/) went live last year, risk maps for dengue, Crimean-Congo haemorrhagic fever, cutaneous leishmaniasis and melioidosis have been made publicly available and are updated at intervals of one week, one month or six months depending on whether changes to the distributions of each disease are detected and depending on the volume of data coming in for each disease. Behind the scenes, we have made improvements to the pathogen distribution models to improve the disease risk predictions.

We have also built new tools to allow users to see the spatiotemporal spread of outbreak data going into each map and to see the impact of potential predictors (temperature, urban/rural status, relative poverty, etc) on the modelled risk. Users can also access a new tool (<https://www.abraid.ox.ac.uk/tools/location/>) to obtain disease risk data for a particular location of interest to them. This can be a precise pair of geographical coordinates or a country and in the latter instance a bespoke national map is provided as either data or an image.

Treating antimicrobial resistant pathogens (Crook, Peto)

The Modernising Medical Microbiology Consortium funded by the NIHR Oxford Biomedical Research Centre, the Wellcome Trust and MRC is working to replace routine culture and phenotyping only methods with whole genome sequencing. The most progress has been made with Mycobacterium tuberculosis. Over the past year, an automated software for processing mycobacterial whole genome sequences has been developed. This yields all the diagnostic information currently produced by the PHE national Mycobacterial Reference Unit and replaces the routine culture based workflow once the organism is growing in liquid culture, a MIGT tub (Becton Dickenson). Considerable progress has been made in optimising the speed of processing which has been achieved using a graph based assembly and prediction software produced by Dr Zamin Iqbal. Progress has been made in extracting and purifying mycobacterial DNA direct from samples that yield acid fast bacteria on staining. Approaching 70% of samples can be sequenced and genomes closed and analysed yielding species and for TB, resistance prediction and genomic matching identifying transmission clusters. Latterly to address speed of sequencing samples have been successfully sequenced using the Minlon produced by Oxford Nanopore.

Investigations into the emergence and spread of resistance to most generations of penicillin and cephalosporin and even carbapenems are being promoted by long read sequencing. Studies have demonstrated the greater than expected genomic plasticity and mobility. This strongly suggests an environmental reservoir underpinning the vast diversity of transposons, plasmids and genera contributing to the spread of extended spectrum β -lactamase and carbapenemase producing organisms. This work is inviting investigations on identifying new interventions to limit spread of these multi-resistant organisms in the hospital environment. Furthermore, to undertake these studies on scale, sequencing using a long read strand sequencing technology is a priority. The group is working closely with Oxford Nanopore Technologies to optimise sequencing on their platforms to reap the benefits of long read and fast sequencing.

Theme 6 Cognitive Health: Maintaining Cognitive Function in Health and Disease

Dementia/neurodegeneration research is a major strategic priority for UK government and continues to be a growing strength at Oxford. The pace of the development of dementia research in Oxford

continues to accelerate with Oxford leading further national and international initiatives, with over £150m funding (including to collaborators) include:

- Dementias Platform UK (MRC, <http://www.dementiasplatform.uk/>) - Director, Prof John Gallacher who moved to Oxford in 2015. The DPUK was established by the Medical Research Council (MRC) in June 2014 and is a £53 million collaboration between universities and drug companies to transform the best dementia research into the best treatments as quickly as possible.
- UK Translational Research Collaboration in Dementia (NIHR) established to pull discoveries from basic science into real benefits for patients – Director: Prof Simon Lovestone
- ARUK UK Oxford Drug Discovery Institute (<http://oxford-ddi.alzheimersresearchuk.org/>) – Directors: Prof Chas Bountra and Prof Simon Lovestone. The DDI is housed within the Target Discovery Institute, Nuffield Department of Medicine at the University of Oxford Old Road Campus, and is uniting collaborative efforts for target identification with sophisticated target development capabilities. The DDI is one of three Institutes within the Alzheimer’s Research UK Drug Discovery Alliance, working alongside Institutes at the University of Cambridge and University College London. The Alliance will accelerate the discovery of novel, effective therapeutics for Alzheimer’s disease and other neurodegenerative diseases. As identified in our AHSC application, Oxford’s approach to dementia and neurodegeneration brings strengths from other areas including immunology (Prof Sir Marc Feldman), oncology and metabolism.
- Oxford Parkinson’s Disease Centre – Director: Prof Richard Wade Martins. The OPDC is a unique multidisciplinary research centre at the University of Oxford supported by Parkinson’s UK with funds from The Monument Trust, one of the Sainsbury Family Charitable Trusts. Established in February 2010, the Oxford Parkinson’s Disease Centre (OPDC) brings together internationally-renowned scientists who work on the genetics of Parkinson’s, the generation of cell and animal models, and the wiring of brain circuits which control movement, with clinical experts in the diagnosis and treatment of Parkinson’s. The OPDC was recently awarded second phase funding (2015-2020).
- Innovative Medicines Initiative grants led or co-led at Oxford including EMIF and EPAD – Simon Lovestone
- Other Oxford-based world leading research in Motor Neuron Disease (Kevin Talbot), Vascular brain disease (Peter Rothwell), Multiple Sclerosis (Lars Fugger) and developing strengths ranging from basic neuroscience, stem cell biology and chemistry, through imaging, informatics and large cohort studies to drug discovery and development including clinical trials.

The Oxford Institute for Human Brain Activity (OHBA) has just completed a £5 million upgrade and now has class leading MRI (Siemens Prisma 3T) alongside magnetoencephalography (MEG). The OHBA upgrade is the first phase of the development of the Warneford site as a centre for translational neuroscience. This development will create a Brain Health Centre with co-location of cutting edge translational human neuroscience and patient care.

The Oxford AHSC cognitive health theme has achieved another of its strategic priorities by building capacity on nursing research by coordinating the resources of the CLAHRC, Oxford Brookes University, University of Oxford and the two NHS Trusts. In collaboration with the Oxford Institute of Nursing and Allied Health Research (OxINAHR, itself an Oxford Brookes University led partnership that brings together the major organisations that contribute to health in Oxfordshire including Oxford Brookes University, Oxford University Hospitals Foundation NHS Trust, Oxford Heath NHS Foundation Trust, Health Education England Thames Valley and University of Oxford), the NIHR Oxford cognitive health Clinical Research Facility has recently recruited to a Senior Nursing Research

Fellowship. This position combines clinical academic research and teaching with the lead role on the CRF.

Prof Helen Dawes and Dr Patrick Esser and the Centre for Rehabilitation (OBU) have been working with Prof Klaus Ebmeier and colleagues (UO,OUH) in the BRC exploring physical activity and movement in older adults and people with Dementia. The group have developed a gait monitoring tool and developing a smart phone gait system, to detect and monitor physical and cognitive disorders, which is currently monitoring 20,000 people in cohorts nationally and internationally. Academics in the Centre for Rehabilitation have been researching the mechanism and impact of a number of interventional approaches in people with neurological/degenerative conditions (Parkinson's, Multiple Sclerosis, Stroke). The gait monitoring system is in the process of translation to utilization through a spin out company.

Inter-professional education and training

Establishment of OxINAHR This year saw the establishment of the Oxford Institute of Nursing and Allied Health Research (OxINAHR) based at Oxford Brookes University (OBU) in collaboration with Oxford University Hospitals (OUH), University of Oxford (UO), Oxford Health NHS Foundation Trust (OHT), NHS Health Education England (HEE) and UO Clinical Academic Graduate School. Led by Professor Debra Jackson, a strategic AHSC position between OBU and OUH, OxINAHR will undertake world class research and evidence-based practice that will produce knowledge to enhance the health and wellbeing of the population of Oxford, Oxfordshire and beyond, with a particular interest in innovation and best practice at the point of care. This includes: OBU Maternal and Women's Public Health (OxBUMP) group to undertake research which aims to reducing preventable disease, and inform guidelines for best practice in labour and childbirth; Pressure Injury Prevention Oxford (PIPOx) to explore the prevalence and characteristics of pressure injuries specifically focusing on patients receiving care in their own home, an under-reported subset of the community; The Centre for Rehabilitation directed by Prof Helen Dawes to target Research, education and care around clinical exercise. OxINAHR has also secured funding to develop Nursing and Applied Health through a dedicated NIHR BRC Fellowship and the INTALECA internship programme for students.

OxINAHR hosts the new UK Magnet Alliance on behalf of Health Education England. The Magnet Recognition Program is the world's only evidenced-based recognition program for the quality of nursing and midwifery. Developed over the last 30 years by the American Nurses Credentialing Centre, there are now about 425 Magnet recognised health care organisations worldwide. These organisations account for many of the world's highest performing hospitals and those with the best patient and staff satisfaction and clinical outcomes.

The Alliance aims to bring together all healthcare organisations in the UK with an interest in pursuing Magnet Recognition plus a smaller number of organisations who have Board approval to proceed with Magnet as a more focused sub-group. Oxford University Hospitals, Nottingham University Hospitals and the Heart of England are key members of this pioneering group.

The AHSC-partnered MSc Medical Genetics and Genomics, being held at OBU, started in Sept 2015 to support the development of a new workforce in healthcare genetics. This has led to cross – institutional lectures, workshops, research projects and tours from OBU, Oxford NHS Genomic Medicine Centre (OUH), Oxford Molecular Diagnostics Centre (OUH), Oxford Molecular Genetics Laboratory (OUH), The Wellcome Centre for Human Genetics (UO), Public Health England, Genome England, and UKBiobank, Centre for Personalised Medicine (UO). For September 2016 this course looks to run at capacity and provide further CPD modules with Nursing and Applied Health focus.

April 2016

Annex 3: Additional points of interest during 2015/2016**April 2015**

- Figures published by the NIHR show OUH ranked among England's best for the time taken to begin clinical trials involving new medicines and treatment. OUH is now ranked second out of the most research-active NHS Trusts for a key measure of how quickly clinical trials can be started. The figures show 95 per cent of OUH studies analysed by the NIHR recruited their first patient within 70 days from when processes began to get the trial underway at OUH Hospitals. This score covers the 12 month period to December 21 2014. It is a significant improvement on the 12 month period to December 31 2013, when only 35 per cent of patients were recruited within 70 days. Getting studies started quickly is a vital step towards ensuring new discoveries are swiftly applied in clinical practice and can attract more research studies in future.
- The brains of babies 'light up' in a very similar way to adults when exposed to the same painful stimulus, a pioneering Oxford University brain scanning study has discovered. It suggests that babies experience pain much like adults. The research was funded by the Wellcome Trust and reported in the journal eLife, lead author Dr Rebecca Slater says "This is particularly important when it comes to pain; obviously babies cannot tell us about their experience of pain and it is difficult to infer pain from visual observations. In fact some people have argued that babies' brains are not developed enough for the, to really 'feel' pain, any reaction being just a reflex – our study provides the first really strong evidence that this is not the case.
- A collaboration is underway between Oxford Health and UoO to trial an innovative sleep treatment, tailored for people admitted to an acute psychiatric wards. Empirical evidence shows that sleep disturbance is a contributory cause of poor mental health and low psychological wellbeing. Consequently, rate of sleep disturbance are extremely high in those admitted to hospital for an acute psychiatric episode. The treatment offered as part of the trial is designed to address this clinical need. It will combine cognitive behaviour therapy for insomnia with light therapy and sleep monitoring devices.
- Cancer treatment with radioactive glass microspheres is to be trialled for the first time in the UK at Oxford's Churchill Hospital. The EPOCH trial will investigate the use of tiny glass microspheres in patients with liver metastasis from colorectal cancer whose cancer has progressed after first line drug therapy. This trial offers a new radiotherapy treatment option to patients with colorectal cancer that has spread to the liver when chemotherapy has not worked. At least 20 patients will take part in the Oxford trial.
- How cutting edge medical research can save the NHS money? was the subject of the NIHR Oxford BRC's first ever Health Economic Symposium. OUH and UoO researchers met at St Catherine's College to evaluate how BRC funded research was having an economic impact on NHS care.
- Stuart Bell (OH) gave an AHSC public lecture 'The changing face of the NHS; where we will be in 5 years time' at Oxford Brookes University.
- Athena SWAN Silver has been awarded to the Faculty of Health and Life Sciences at Oxford Brookes University in recognition of their commitment to advancing women's careers in science and medicine in higher education. The latest round of awards announced by the Equality Challenge Unit means that Health and Life Sciences is the first Faculty in the University to be awarded Silver status. The University was awarded Institutional Bronze status in 2012.

May 2015

- The NIHR Oxford Cognitive Health Clinical Research Facility (CRF) at the Warneford Hospital held a successful Open Day on May 19. The event supported the 'International Clinical Trials Day' and was attended by patients and carers, health care professionals, academics and the general public. It provided an opportunity to showcase the innovative research activities carried out throughout the Oxford CRF, OUH and UoO. Talks covered a range of topics; one of the most popular talks was given by a patient who has been actively involved in mental health research. This lady spoke about her personal experiences of living with bipolar disorder; giving insight into how she copes with her illness, her clinical journey, and her experience of taking part in research.
- Oxford University researchers have found a future treatment for heart disease, going back to a drug first developed in 1950. The drug; Hydroxychloroquine was created to combat Malaria, and was later found to be useful in the treatment of Lupus and rheumatoid arthritis. Now a team at UoO Department of Pharmacology and Physiology, Anatomy and Genetics has found that the drug can also reduce heart rate. Their report, to be published in journal *Heart Rhythm*, says that the treatment could benefit people with heart failure.
- More than 10 years after the completion of the Human Genome Project, doctors are a step closer to using the whole genome sequencing to diagnose and treat patients with genetic diseases. This follows the WGS500 study by researchers from the UoO and the DNA sequencing company Illumina. The success of the research has already had a dramatic impact in the UK, prompting the government to announce that the NHS will sequence 100,000 genomes for patients as part of the Genomics England programme, with the USA and other countries to follow suit. To date the study has led to over 10 new disease genes being discovered – for inherited cancers and blood disorders, epilepsy and conditions effecting the muscles or development. This knowledge can help our understanding of why diseases occur and assist in the diagnosis and clinical management of thousands of patients.
- The work of the AHSC and AHSN was highlighted at BioTrinity 2015, an event with a particular focus on partnerships between pharma, life and biosciences, universities and the NHS. This important event has been sponsored by the Oxford AHSN for the last three years and provides opportunities for academics and clinicians to submit posters for the Innovation Poster Showcase and to meet with potential investors and collaborators.

June 2015

- Cancer Research UK launches a Major Centre and grant of £5 million in Oxford, to help deliver its vision for precision cancer medicine. The Oxford Centre represents a partnership between Cancer Research UK, the UoO and OUH, and will act as a vital research hub for the Cancer Research UK Cancer Network, drawing together expertise, encouraging collaborative research, and bridging the gap between innovative laboratory work and benefits for patients.
- The Grand Challenges Explorations Grant for Ground breaking Research in Global Health and Development was awarded to The Institute of Biomedical Engineering (IBME) and Nuffield Department of Obstetrics and Gynaecology, UoO. The grant funds individuals worldwide to explore ideas that can break the mould in how we solve persistent global health and development challenges. The Oxford project is one of more than 50 Grand Challenges Explorations Round 14 grants announced by the Bill and Melinda Gates Foundation. To receive funding, the Oxford team and other Grand Challenges Explorations winners demonstrated in a two-page online application a bold idea in one of five critical global health and development topic areas that included development of the new ways to measure fetal and infant brain development.

- TB sufferers will be able to get drug treatment sooner thanks to a new whole genome sequencing technique to determine for the first time which drugs to give sufferers. UoO researchers at the John Radcliffe Hospital have developed a genetic test that can detect which drugs will effectively treat people with the disease and those it will not. It means doctors will be able to rule out but also, for the first time, rule in which drugs to give to sufferers without the need for a lengthy laboratory culture test. The test will return results in about three weeks.
- Sir John Bell (AHSC Chair) gave a public lecture 'Creating a New Taxonomy of Disease' at Oxford Brookes University.

July 2015

- Researchers, Government leaders and industry professionals who led the worldwide fight against Ebola came together in Oxford for the first time since the disease was largely controlled. The Oxford BRC was among the organisations supporting the conference held at the Said Business School. It examined how leaders in research, Government and industry collaborated to develop vaccines to tackle the outbreak, which began in March 2014. Discussions also included how the collaborative approach can lead to new approaches to drug discovery and development.
- A potential new way to tackle one of the world's most common lung diseases is to be investigated after a study found a link between sufferers' iron levels and worse health outcomes. It comes after doctors and researchers found that one in five people with COPD who took part in a UoO study funded by the Oxford BRC had iron deficiency. Recruitment is underway for a two year trial at the Churchill to give iron intravenously to patients with COPD to see if this boost will improve the debilitating condition.
- Heart failure patients have praised the use of an android-based tablet computer that allows them to monitor their condition and communicate with researchers. The device allows them to record readings wirelessly via Bluetooth through a blood pressure and heart rate monitor and electronic weighing scale. A survey of users reported they found the system easy to use and helped reassure them about managing their condition. It is hoped the results will help inform the use of digital technology to help patients manage their heart failure and reduce the need for GP and hospital visits, cutting NHS costs.
- The first Alumni Summit was held during the year at the Said Business School, drawing in a broad cross-section of delegates, including international life sciences executives who were alumni at one of the universities within the Oxford AHSN region. A significant number were from the UoO. The conference showcased expertise in precision medicine from across the region and details of the programme are available on the website <http://www.alumnisummit.com>. The event was very well received and the Minister for Life Sciences, George Freeman, addressed the delegates at a conference dinner. The team continues to interact with delegates and consider follow-up opportunities. The Summit was organised by the Oxford AHSN, a key partner with the Oxford AHSC.

August 2015

- Respiratory Syncytial virus (RSV) kills around 200,000 people worldwide each year. Both the elderly and infants are especially vulnerable to developing severe disease with RSV, a major cause of bronchiolitis. Oxford University researchers have successfully completed the first human trial of a vaccine for this common virus. Professor Andrew Pollard who leads the Oxford Vaccine Group, said: "RSV causes a lot of emergency admissions, especially in babies, and there is currently no way to prevent it. That means it is a priority for vaccine development. Professor Pollard is also the joint

clinical lead for the Oxford AHSN's Children's Clinical Network which will ensure that outcomes can be spread widely once the research programme has been completed.

September 2015

- As part of the Oxford Open Doors programme where city institutions open their doors to the public, the Oxford BRC hosted tours on Friday 11 September. Visitors were given a talk, demonstration and tours of the OUH Cardiovascular Clinical Research Facility and the cutting edge facilities of the Acute Vascular Imaging Centre (AVIC).
- The first meeting of its kind in Europe took place at the John Radcliffe Hospital, the topic was a rare cardiovascular disease, Loeys-Dietz syndrome, a treatable genetic disorder that affects the connective tissue in the body. Over 160 people attended; Patients, their families, clinicians and scientists came from around the world to the all day programme with talks from doctors and from clinicians from across the disciplines of surgery, genetics and musculoskeletal.
- Establishment of OxINAHR - This year saw the establishment of the Oxford Institute of Nursing and Allied Health Research (OxINAHR) based at Oxford Brookes University (OBU) in collaboration with Oxford University Hospitals (OUH), University of Oxford (UO), Oxford Health NHS Foundation Trust (OHT), NHS Health Education England (HEE) and UO Clinical Academic Graduate School. Led by Professor Debra Jackson, a strategic AHSC position between OBU and OUH, OxINAHR will undertake world class research and evidence-based practice that will produce knowledge to enhance the health and wellbeing of the population of Oxford, Oxfordshire and beyond, with a particular interest in innovation and best practice at the point of care. This includes: OBU Maternal and Women's public Health (OxBUMP) group to undertake research which aims to reducing preventable disease, and inform guidelines for best practice in labour and childbirth; Pressure Injury Prevention Oxford (PIPOx) to explore the prevalence and characteristics of pressure injuries specifically focusing on patients receiving care in their own home, an under-reported subset of the community; The Centre for Rehabilitation directed by Prof Helen Dawes to target research, education and care around clinical exercise. OxINAHR has also secured funding to develop Nursing and Applied Health through a dedicated NIHR BRC Fellowship and the INTALECA.

October 2015

- Sir Jonathan Michael retired as CEO of the Oxford University Hospitals following its designation as an NHS Foundation Trust on 1 October. His successor was Dr Bruno Holthof from Antwerp.
- OUH named Digital Hospital of the Year 2015; the OUH won the award in the EHI 2015 awards from a shortlist of five contestants. The Trust has a long history of innovation and clinical excellence and has taken big steps towards establishing fully digital hospitals, making patients' medical history and care requirements available on the Trust's electronic patient record (EPR) system. The award also recognised the BRC projects; SEND; and RealTime Blood Transfusion Data and Decision Support project and Smartphone app to manage diabetes in pregnant women – a project being developed across Region with the support of the Oxford AHSN.
- The Precision Medicine Catapult centre established in Oxford; Oxford has been named as a centre for excellence in leading the drive to tailor more treatments to the needs of individual patients. The centre will bring together business and research to develop new products and services. This project will be led by the Oxford AHSN and will connect partners across the NHS, universities, and industry with a particular focus on harnessing big data and developing new diagnostic tests. The Commercial Director of the AHSN works closely on Theme 2 of the AHSC with Professor Chas Bountra.

- Oxford University will lead a new collaborative research initiative for Spinal Muscular Atrophy (SMA) research in the UK over the next three years. The programme is funded by the SMA Trust, founded in 2003, and is the only UK charity solely focused on funding research into finding a cure and treatments for SMA. The main aims are to develop existing drug targets and identify new neuroprotective therapies to maintain nerve function throughout the lives of people living with SMA, and to identify improved ways of delivering treatments in order to maximise benefit throughout the body.
- We depend on electrical waves to regulate the rhythm of our heartbeat. When these signals go awry, the result is potentially fatal arrhythmia. A team of researchers from Oxford and Stony Brook Universities have found a way to precisely control these waves – using light. Their results are published in the journal Nature Photonics.
- The Equality Challenge Unit announced today that the Medical Sciences Division Departments of Biochemistry, Paediatrics, Experimental Psychology, Physiology Anatomy and Genetics and the Nuffield Departments of Clinical Neurosciences, Obstetrics and Gynaecology, Population Health, Orthopaedics Rheumatology and Musculoskeletal Sciences and the Dunn School of Pathology have all received Athena SWAN silver awards. They join existing silver award holders, the Department of Psychiatry, National Perinatal Epidemiology Unit and the Nuffield Departments of Clinical Medicine and Primary Care Health Sciences to bring the total number of silver awards held by departments and units in the Medical Sciences Division to 13.

November 2015

- A research team at Oxford Brookes receive £70,000 to assess whether chocolate can help to reduce the symptoms of multiple sclerosis (MS). Dr Emma Gray, Head of Clinical Trials at the MS Society said “We are delighted to be supporting this project as it is quirky and unusual, but ultimately based on robust scientific evidence. At the MS Society we want to explore creative ways of helping people with MS cope and we look forward to seeing the study progress”.
- The Jenner Institute at Oxford University, together with partners Imaxio and GSK, has started a phase 1 clinical trial of a novel vaccine candidate aimed at blocking the transmission of malaria. The clinical trial is being conducted at Southampton, the lead trial site, and Oxford. It is a dose escalation study, where amounts of the potential vaccine are increased. The study will assess the safety of the vaccine candidate in people and its ability to generate immune responses that inhibit the growth of malaria eggs in mosquitos, preventing transmission of malaria.
- Oxford Health NHS FT has recently joined another four leading mental health trusts in England in a partnership aimed at revolutionising dementia and health research in the UK. Case record Interactive Search (CRIS) was developed by the SLAM NHS Trust with NIHR BRC Infrastructure funding. This new system allows pseudonymised Electronic Health Records (EHR) to be interrogated for research, audit and service evaluation purposes. The CRIS software removes or covers up any information that can identify patients and allows authorised researchers to investigate hypotheses and identify potential patient cohorts. The AHSN’s Director of Informatics, Mike Denis, works to support this programme for the AHSC as well highlighting the collaboration between the two organisations.
- ‘Mood Maths’ is being used to understand more about bipolar disorder, little is known about the processes underlying bipolar disorder, while treatments remain limited. UoO researchers have set out to address this by using mathematical modelling to better understand the ‘mood dynamics’ of people with bipolar disorder.

- Two research teams at Oxford have shared £2 million NIHR funding to tackle the increasing issue of antibiotic resistance. In one study, primary care researchers in Oxford and Cardiff will test whether a probiotic supplement can reduce the number of infections in care home residents, in a bid to cut antibiotic use in this high risk group. Another study will review how best to improve the prescribing of antibiotics.
- Queen's Anniversary Prize has been awarded to Oxford's Institute of Biomedical Engineering (IBME). The Queen's Anniversary Prize recognises universities and colleges which have demonstrated excellence, innovation, impact and societal benefit. The IBME is renowned for its pioneering work in biomedical engineering, it has been at the forefront of innovation in medical technology for the past seven years, hosting world-leading projects such as the first human liver to be kept alive at body temperature outside the body.
- The link between chronic pain that affects millions of women and hormones that control the menstrual cycle and reproductive function is to be studied for the first time by John Radcliffe Hospital researchers. The University of Oxford study is to determine the extent to which hormone production is altered in women with chronic pain so they can be better diagnosed and treated. Dr Katy Vincent, a gynaecologist leading the study said; "chronic pain can have devastating effects on women's lives. It impacts on all areas; their relationships, ability to work and care for their children, emotional wellbeing and self esteem".
- NIHR Collaboration for Leadership in Applied Health Research and Care (CLAHRC) Oxford ran a stakeholder symposium open to and delivered by AHSC partners; Dr Rob Bale and Jackie Gough (OH), Prof Helen Dawes (OBU) presented at the Symposium. The Oxford AHSN Senior team also attended and took part in this event.
- Prof Mary Boulton (OBU) ran two workshops for HEE/NIHR Integrated Clinical Academic Programme for Nurses, Midwives, AHPs and Clinical Scientists for the AHSC partners, promoting medical fellowships and research.

December 2015

- 'True Colours', the pioneering mood monitoring system, developed by Oxford Health R&D and the UoO is being lauded as one of the new technologies that could transform Oxfordshire's health and social care services.
- Scientists have developed an easy-to-use computer program that can quickly analyse bacterial DNA from a patient's infection and predict which antibiotics will work, and which will fail due to drug resistance. The Mykrobe Predictor software, developed by Dr Zamin and colleagues at the Wellcome Trust for Human Genetics, UoO, runs on a standard laptop or tablet without the need for any specialist expertise. The program can analyse the entire genetic code of a bacterium in under three minutes, once a bacterial sample has been cultured and its DNA sequenced. The software is currently being trialled in three UK hospitals to see whether it could help speed up diagnosis of drug-resistant infections and enable doctors to better target the prescription of antibiotics.
- Blood pressure-lowering drugs should be offered to all individuals at high risk of having a heart attack or stroke regardless of their blood pressure at the start of treatment, according to the largest meta-analysis conducted to date involving over 600,00 people, published in The Lancet. In this study, Professor Kazem Rahimi from the George Institute for Global Health, UoO and colleagues analysed the findings of 123 large-scale randomised trials comparing different blood pressure targets from January 1966 to July 2015. They found that treatment with any of the main classes of

blood pressure-lowering drugs significantly reduced risk of major cardiovascular events, stroke, heart failure, and death proportional to the extent to which blood pressure was lowered.

January 2016

- A patient who is the first in the UK to receive the world's most advanced 'bionic eye' has been able to read for the first time in more than five years. Surgeons at the Oxford Eye Hospital at the Oxford University Hospitals implanted a tiny electronic chip at the back of the patient's right eye as part of ongoing NHS-funded research of the technology. Professor Robert MaLaren who is leading the trial said "restoring sight to the blind using an electronic device presents huge challenges for the technology, the surgery and above all, the patient. But at the same time, we know the huge potential benefit if we get it right".
- The Pancreatic Cancer Research Tissue Bank brings together surgeons, pathologists, oncologists, researchers, database experts to coordinate a national resource that will help develop new treatments and bring these to patients much faster. OUH is one of five partner hospitals that will act as a Tissue Bank collection centre, adding samples of tissue, blood, urine and saliva from around 1,000 consenting new patients each year.
- Women have joined the fight against obesity by helping OUH researchers discover how to avoid piling on the pounds during pregnancy. About half of all women of childbearing age in England are either overweight or obese, according to government statistics. Being obese increases our chances of developing a number of health conditions including Type 2 diabetes, coronary heart disease and joint problems. The study aims to find out if being weighed in routine appointments and talking with midwives if they gain too much weight helps pregnant women to avoid becoming obese.
- A ground breaking study into gender equity is to take place at the NIHR Oxford BRC and Guys and St Thomas BRC. It will focus on women's contributions to the leadership, talent funding, and outputs in clinical research. The study is aimed to maximise the NIHR's scientific, societal and economic return on investment in research.
- Scientists at the UoO will investigate a new way to identify people who might be at high risk of a stroke. Dr Luca Biasioli of UoO has been backed by the British Heart Foundation to study whether a new type of MRI scanning technique can offer a more accurate and easier way of identifying the most dangerous build-ups of plaque that cause stroke.
- An Oxford spin-out is developing advanced tiny metallic mesh tube devices invented by engineers and clinicians at the UoO to treat patients suffering from brain aneurysms.
- An Oxford Brookes academic has been awarded the prestigious Queen's Nurse title, 36 years after her grandmother received the same accolade. Jennifer Kirman is currently the course leader for Specialist Community Public Health Nursing, District Nursing and Community Children's Nursing in the Department of Nursing at Oxford Brookes University.
- A total of £675,000 has been awarded to senior Oxford researchers to support research that will have a direct benefit on NHS care. The NIHR Oxford Biomedical Research Centre (BRC) and the NIHR Oxford Biomedical Research Unit in Musculoskeletal Disease (BRU) have announced the successful applicants for its first Principal Fellow Competition. The winners are:
 - Prof Eleanor Barnes, Professor of Hepatology and Experimental Medicine, Nuffield Department of Medicine, University of Oxford.

- Prof Matthew Costa, Professor Orthopaedic Trauma and Honorary Consultant Trauma Surgeon, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford.
- Prof Dominic Furniss, Associate Professor, Wellcome Trust Intermediate Fellow, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford.
- Prof Debra Jackson, Professor of Nursing, Oxford Institute of Nursing and Allied Health Research, Oxford Brookes University and Oxford University Hospitals NHS Foundation Trust.
- Prof Julian Knight, Professor of Genomic Medicine, Nuffield Department of Medicine, University of Oxford.
- Prof Clare Mackay, Associate Professor, Senior Research Fellow, Department of Psychiatry, University of Oxford.
- Prof Helen McShane, Professor of Vaccinology, Wellcome Senior Clinical Research Fellow and honorary consultant physician, Jenner Institute, Nuffield Department of Medicine, University of Oxford.
- Prof Robert MacLaren, Senior Clinical Research Fellow and Honorary Consultant Ophthalmologist, Nuffield Department of Clinical Neurosciences, University of Oxford and Oxford University Hospitals NHS Foundation Trust.
- Dr Adam Mead, Associate Professor of Haematology and MRC Senior Clinical Fellow, Weatherall Institute of Molecular Medicine (WIMM), Radcliffe Department of Medicine, University of Oxford.
- Prof Graham Ogg, Professor of Dermatology and Deputy Director of MRC Human Immunology Unit, Radcliffe Department of Medicine.
- Prof Andrew Pollard, Professor of Paediatric Infection and Immunity and Director of the Oxford Vaccine Group, Department of Paediatrics, University of Oxford.
- Prof Alison Simmons, Professor of Gastroenterology and NIHR Research Professor, MRC Human Immunology Unit and Translational Gastroenterology Unit, Weatherall Institute of Molecular Medicine, Radcliffe Department of Medicine, University of Oxford.
- Prof Jenny Taylor, Associate Professor, Programme Director, NIHR Oxford Biomedical Research Centre Genomic Medicine Theme and Co-Chair Molecular Diagnostics Working Group, Wellcome Trust Centre for Human Genetics, University of Oxford.
- Prof Jeremy Tomlinson, Professor of Metabolic Endocrinology, Oxford Centre for Diabetes, Endocrinology and Metabolism, Radcliffe Department of Medicine, University of Oxford.
- Prof Sarah Walker, Professor of Medical Statistics and Epidemiology, Nuffield Department of Medicine (Experimental Medicine Division), University of Oxford.

February 2016

- Cancer Research UK Oxford Centre has funded a 55inch wide display screen for the teaching of histopathology specialty trainees and medical students from the UoO and the 500 researchers and clinicians that make up the Oxford Centre. It allows users to ‘pinch and pull images’ to identify the features of tumours that could predict their prognosis. It is hoped the technology will improve teaching of junior doctors and medical students so they can provide the best possible cancer diagnosis to patients.
- ‘People are Messy’ is a play touring the county, devised and produced by the Theatre of Debate with support from the NIHR Oxford BRC and the Wellcome Trust. ‘Why should the public have a say in what research gets funded and how? and ‘surely doctors and researchers know best?’ were among complex issues explored in the play.
- Pancreatic Cancer Fund is funding six new research projects with a total of £1 million. UoO Department of Oncology researcher Dr Bart Cornelissen will be leading one of the six projects. Dr

Cornelissen aims to use the powerful imaging techniques to diagnose early stage pancreatic cancer. His team has already developed an imaging agent that attaches to protein known as claudin-4 which is expressed in the early stages of the disease. This project will develop the agent so that this protein can be rapidly detected and monitored using PET scanners, which are increasingly common in hospitals.

March 2016

- Researchers have been working with patients to study how to reduce noise in the intensive care unit at the John Radcliffe Hospital. Concern that intensive care noise was delaying recovery has led to a £280,000 grant from the NIHR Research for Patient Benefit Programme, to understand the noise issues and then work with them. Professor Duncan Young from Oxford's Kadoorie Centre for Critical Care Research and Education, said; "High levels of noise make it harder to sleep, sleep deprivation leads to confusion, and confusion is thought to complicate the healing process and slow recovery".
- Blood pressure measurement is frequently used by medics to understand our health, and dangerously high blood pressure can lead to serious conditions like heart attack or stroke. Scientists at Oxford University have developed a new way of estimating our true underlying blood pressure that overcomes common problems in a clinical setting which can lead to misleading results.
- Electrical brain stimulation could support stroke recovery; A team from Oxford's Nuffield Department of Clinical Neurosciences led by Professor Heidi Johansen-Berg and Dr Charlotte Stagg, studied the use of transcranial direct current stimulation (IDCS) to support rehabilitation training. The study found that patients who had received the IDCS were better able to use their hands and arms for movements such as lifting, reaching and grasping objects.
- Bicester Healthy Towns Project - The AHSC members and collaborative partners (Councils, Age UK, Isis Innovations, HETV, CCG, and AHSN) were successful in an application to the NHS England Healthy Towns Project for a five-year initiative to improve health through built environment in the local area. This will pilot with 393 homes in Bicester for improved public health initiatives, with a focus on integrated healthcare technologies, digital interactive tablet systems in the home, public data and patient activated technologies. Oxford Brookes University is holding the initial development workshops in collaboration with Oxford AHSN.

Hot of the press

April 2016

- The accelerating progress in Oxford translational research in dementia was recognised in April 2016 when the Secretary of State for Health, Right Hon Jeremy Hunt MP, visited the Oxford AHSC Cognitive Health and Dementia theme. The visit was hosted by Prof John Geddes and included the Department of Psychiatry (with Stuart Bell, Bruno Holthof, William James, June Girvin, Mike Denis), the Oxford Institute for Human Brain Activity (Kia Nobre and Clare Mackay) and the ARUK UK Oxford Drug Discovery Institute.