



**Trust Board Meeting in Public: Wednesday 10 July 2019**

**TB2019.83**

<b>Title</b>	<b>Academic Health Science Centre Annual Report 2018-19</b>
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<b>Status</b>	This is a new paper
<b>History</b>	One of a regular series of Annual Reports submitted to NIHR and NHS Boards

<b>Board Lead(s)</b>	<b>Professor Meghana Pandit</b>			
<b>Key purpose</b>	Strategy	<b>Assurance</b>	Policy	<b>Performance</b>

## Executive Summary

1. The paper is the fifth Annual Report produced by the Oxford Academic Health Science Centre since designation on 1 April 2014. An appendix covering the activities since designation is attached, and also referenced in the Chief Executive Officer's Report to Trust Board.
2. The report demonstrated the significant work and collaboration of the founding partners: Oxford Brookes University, Oxford Health NHS FT, Oxford University Hospitals NHS FT (which hosts the AHSC) and the University of Oxford. The Oxford Academic Health Science Centre is embedded within the Oxford Academic Health Science Network and the Board of the AHSC is chaired by Professor Sir John Bell, Regius Professor of Medicine.
3. The Report provided an overview of 2018/2019 activities covering progress with further aligning the strategic objectives of the NHS providers and universities in order to harness and integrate world-class research, excellence in health education and excellence in patient care. The report also covers progress in e-health informatics, contributions to the economy and partnerships with industry.
4. Updates are provided on the original six themes and the changes to the work as the AHSC has progressed and its approach has evolved. A review was held in February 2018 which informed these changes. In addition, the establishment of the Research and Innovation Oversight Group has enabled a better cross-partnership focus and collaboration on these two areas, critical for early translation and adoption. This group includes the two NIHR BRCs and is chaired by Professor Chas Bountra, Pro VC for Innovation at the University of Oxford.

### Recommendation

5. The Board is asked to receive the report which was submitted, as required, to the Department of Health and Social Care in June 2019, and to note the excellent progress that continues to be made.

Additional information on the AHSC and its partners can be found at [www.oxfordahsc.org.uk](http://www.oxfordahsc.org.uk)

OXFORD ACADEMIC HEALTH SCIENCE CENTRE

2014 TO 2019

SUMMARY OF ACTIVITIES

# Theme	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
<b>General</b>	<p>Good progress integrating training related to Themes, e.g. genomics. OBU appointed Professor of Nursing and Nursing Research focusing on research, health disparities and workforce resilience</p> <p>Capital plans being developed and AHSC Board engaged in oversight of Master Plans. Proximity of existing facilities create a Campus, now being extended particularly at OBU and the UoO Old Road site.</p>	<p>All partners coordinating Master Plans particularly for academic, research and clinical relationships across Headington. Links also strong with Oxford Councils and CCG. OUH Strategy - closer to Home, Focus on Excellence, Go Digital and the Master Plan - developing. AHSN closely integrated with AHSC and AHSC Board has overseen preparation and submission of two critically importance bids - OUH/UoO NIHR BRC (renewal) and OH/UOH NIHR BRC bid. NIHR funded CRF renewal bid also underway covering neuroscience, stroke, vascular dementia and neuro-imaging. OBU actively involved in all bids.</p>	<p>BRC funding for OUH retained and new funding for OH BRC. Oxford School of Nursing &amp; Midwifery established to provide clinically embedded and research-led training &amp; education. UoO supported through the AHSC Board collaboration</p> <p>on Master Planning continues - academic health campus becoming a reality. OUH and UoO working together to review clinical divisions and how academic/NHS links for clinical services and research can be strengthened</p>	<p>All six themes have support groups bringing the partners together. Plans are in place for a group to bring together oversight of Research and Innovation activities. A charitable Vehicle - Oxford Academic Health Partners was established in Sept. 2017 and this will provide partners with a vehicle for collective actions to support research and education.</p> <p>An Away Day was held in Feb 18 to review partnership to date and to explore the next five years. No firm news on redesignation but all agreed to continue and extend active partnerships. ☒</p>	<p>To coordinate the research &amp; innovation infrastructure across the AHSC, the RIOG has been constituted as a committee of the AHSC. RIOG is responsible for coordinating and overseeing strategic and scientific direction of collaborative research undertaken by AHSC partners and for promoting and improving the 'pull through' of research from basic discovery to translation, evaluation and implementation leveraging resources such as the NIHR infrastructure. ROIG will also provide the forum for the partnership to identify innovations that address priorities for AHSC and support the further development or evaluation of those innovations to promote their adoption into practice involving the NIHR BRCs, the CLAHRC &amp; the MIC.</p> <p>Oxford CLAHRC taking part in NIHR redesignation completion due to be completed in 2019/2020</p>
					<p>The plans for the development of the Warneford site are continuing apace with the signing of a joint Memorandum of Understanding between NHS, University and Donor and the creation of a Joint Vehicle. The JV will develop Warneford Park with integrated clinical services, research and commercial space – and a new Oxford College.</p> <p>OSNM appointed Dr Mary Malone as Director and Prof Paul Carding as Director of the Research of OxINMAHR. Both bodies are AHSC partnership initiatives and these new appointments act to deepen joint working.</p>
<b>1 Big data delivering the digital medicine revolution</b>	<p>Big Data Institute being built; 5-600 scientists with interests in genomics, image analysis, machine learning, digital analysis of patient physiological variables, collection and analysis of electronic patient data</p> <p>Development of genomic analysis. Oxford chosen as Genomic Medicine Centre; Digital data being generated from patients - helping patients with gestational diabetes, congestive heart disease, track and trigger. OUH, OBU and OH collaborating on training programme for clinical scientists in clinical genomics. OBU developing programme in computing sciences for wide range of health professionals</p>	<p>Big Data Institute 'topped out' at end Feb 16. Theme Board has provided coordination of activities across all partners including OUH BRC. - e.g. integrated, longitudinal research record and data warehousing infrastructure for cancer and microbiology translational research; clinically-validated smartphone system based early warning system for management of gestational diabetes (used in 5 NHS trusts); development of evidence-based early-warning scoring system for acute hospital; large novel data sets for UK Biobank.</p> <p>AHSN and AHSC partners working closely together to ensure extended reach of activities</p>	<p>Big Data Institute opened - will support work on clinical informatics, information governance, and big data analytics - projects underway include molecular pathology, response to checkpoint blocking immunotherapy on early oesophageal cancer, digital health approaches to management of chronic diseases using EHR, smartphones etc; development of clinically applicable algorithms for patient stratification in IBD, AF, stroke and vascular dementia as well as emergence of infection threats. OH and OUH identified as Global Digital Exemplars. OH using Skype and Face time for consultations, and use of iPads, True Colours App. OUH continues its development of EPR including electronic prescribing</p>	<p>Oxford one of 6 sites to receive funding as part of MRC HDR. In addition MRC funding received for pump priming research into treatments in mental health. UoO Big Data Institute in place.</p> <p>Health Informatics Collaborative has been joined by OH BRC and coordinating centre is hosted by the BDI.</p>	<p>UoO &amp; Prof Martin Landray will lead a sprint exemplar project to use NHS data to accelerate recruitment into clinical trials and increase the opportunities for NHS patients to participate in research. It will enable researchers to work with the NHS and industry partners to accelerate clinical trial recruitment and provide answers to important research questions more rapidly.</p> <p>This project will use the 'hospital episode' information to identify potentially suitable patients from the UK who could be asked if they wish to take part in clinical trials. Oxford will house one of the five new technology centres, and collaborates in two of the other Centres, with local activities integrated in the BDI. The centre is the National Consortium of Intelligent Medical Imaging (NCIMI), in which UK Research and Innovation is investing £10 million. The NCIMI will benefit from a further £5 million of funding provided from its commercial partners.</p>

OXFORD ACADEMIC HEALTH SCIENCE CENTRE

2014 TO 2019

SUMMARY OF ACTIVITIES

#	Theme	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
						<p>OUH is one of the NHS trusts that will be part of the consortium, which will include large commercial partners, such as GE Healthcare and Alliance Medical, local SMEs and university spin-out companies, as well as charities and patient support groups. Philips and OUH team up to deploy innovative digital pathology network. OUH creates advanced diagnostic network to help improve patient care across the regions of Wiltshire, Buckinghamshire and Oxfordshire.</p> <p>Royal Philips (NYSE: PHG, AEX: PHIA), a global leader in health technology, and OUH (July 18) announced plans to create a digital pathology network to help drive faster and more efficient diagnoses for patients. OUH will deploy the Philips IntelliSite Pathology Solution at the John Radcliffe Hospital in Oxford, which will serve as a central laboratory service for partner sites at Milton Keynes University Hospital and Great Western Hospital in Swindon.</p>
						The joint meeting with CUHP identified significant opportunities for increasing scale of data collection and development of cohorts.
2	<b>Building novel NHS, University and Industry relationships</b>	<p>Key county for biotech, med tech and life sciences e.g. Circassia and Adaptimmune. Harrington Fund established and UoO lead UK institution. Oxford Innovation Fund has £250 m of risk capital. UoO Structural Genomics Consortium - platform for open drug discovery - well established Novo Nordisk due to establish research centre - first outside Denmark - and Bioescalator in final stage of planning</p>	<p>Expansion of Open Innovation Programme at SGC continues and engaged with (e.g.) Bank of England, Oxford Martin School.</p> <p>A number of new collaborations including Bayer, Merck and UCB (£20m+)</p>	<p>Work on Bioescalator continues. Partnership in place with Novo Nordisk for research centre; Lab282 created with Evotec, OSI &amp; Celgene creating £13m fund. In addition, collaboration with KCP partners in cannabinoids for pain, cancer &amp; inflammation secured £10m. SGC received funding from Oxford Martin School for collaboration with AHSN &amp; Office of Health Economics to explore new R &amp; D Models, alternative strategies to IP protection and to quantify benefits of open research. Discussions underway with national centres for new discovery platform for new medicines for ageing. Sir David Cooksey Fellowships have been established with the focus for the 1st 4 on cell &amp; gene therapy, big data/digital health and medical devices.</p>	<p>Construction of BioEscalator expected to complete during 2018. Management Board and Business Manager in place.</p> <p>Collaboration with Barco NV to support optimisation of processes of clinical pathways in oncology. iTAC established with core partners The Francis Crick Institute, UoO and AHSC and AHN, University of Dundee, University of Birmingham and Birmingham Health Partners and the Medicines Discovery Catapult an award of £4.820m for open innovation and drug discovery for ageing. Cooksey Fellows are working with OUH and others on Internet of Things and impact on models of care. Studies also into barriers to innovation adoption.</p>	<p><b>RIOG to take over management for Theme 2</b> bringing innovation and research together across all partners. TOR agreed by Board in June 2018 and first meeting held in February 2019.</p> <p>Board agreed no further formal engagement with Med City</p> <p>The AHSC partners have continued to work on closer alignment of their academic and operational development, which includes creating more effective pathways for the translation of research into practice. 2018 saw two notable examples of this:</p>

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						TheHill is a digital health innovation network at the nexus of the Oxford NHS Trusts, UoO, OBU, the local digital community with links to London and across the Thames Valley and is Chaired by a representative of the AHSC partnership. TheHill formally relaunched on 13 February 2019 with support from partners including the AHSC. It was created to address the challenge of identifying and developing emerging innovations that arise from daily practice in the NHS, research in the academia and inspired ideas from individuals and teams. Workshops on User-Centred Design and Economic Evaluations have been oversubscribed and more than 40 attended the social mixer. It guides innovators through a development pipeline to implement solutions which are commercial and impactful; transforming care and improving the lives of patients and healthcare professionals. Seconded experts-in-residence work with the steering committee, project managers and administration team to provide expertise and mentoring for SMEs. For more about the network visit: <a href="http://www.thehill.co">www.thehill.co</a> .
						The University of Oxford and OUH lead the NCIMI initiative funded by Innovate UK and working in partnership GE Healthcare and Alliance Healthcare. NCIMI will explore the use of AI in medical imaging and is a national collaboration of 15 NHS Trusts.
3	<b>Modulating immune response for patient benefit</b>	Major initiatives include work on Ebola vaccines and RSV vaccines - latter linked with GSK. STOP-HCV programme funded through MRC with Gilead Sciences; NHIC project to coordinate patient data collection for integrated clinical studies of viral hepatitis. OBU/OUH working on novel immunodiagnostic approaches with NIHR DEC and industrial partners	Oxford-wide system in place for coordination of internal efforts and interface with industry. Funding from UoO and links with UCB, Celgene, GSK and Roche. Vaccines programmes being developed - Zika' trial for preventive vaccine for RSV with GSK completed recruitment. Trials for typhoid vaccines underway - Gates and EU. New treatment approaches for allergy treatment and severe asthma. Oxford event held to develop innovations in immunotherapy with industry.	Progress being made in identification of novel targets - Oncostatin M (OSM) identified as potential therapeutic target for IBD. Gastroenterology & and Mucosal Immunity BRC theme key; programme on real-time data collection in ulcerative colitis to relate fluctuations in activity with biology of disease. True Colours for ulcerative colitis is real time web-based programme for patients.	Major focus on development of Oxford Immunology Network with key strategic objectives across the partners, Dedicated immunology website and manager, 152 groups engaged - award of nearly £600k for Human Immune Discovery Initiative. HIDI is gateway to immunological resources sponsoring for Discovery Platforms including deep immune phenotyping, immune pathology, genomics and research for patient benefit	Creation of HIRO (Human iron Research at Oxford) Industry funding £500k and Fell fund matching support for post and grants. Expansion of HIDI to incorporate new pipeline in Metabolism collaborating with Diabetes and Metabolism BRC theme. Establishment of Centre for Microbiome studies linked to HIDI and based at Kennedy to probe role of gut microbiome in inflammatory diseases New first in class trials in inflammatory skin disease ANB020 (AnaptysBio). Creation of new vaccine manufacture and innovation centre (Innovate UK grant = £66m).
						The Immunology Network is leading the development of a Human Immune Discovery Initiative (HIDI), an initiative that aims to improve accessibility to immunological assays and expertise for all researchers across the University and beyond. The HIDI Internal Fund had its first call in June 2018 and received 20 applications from nine Depts. HIDI funded nine projects at a total cost of £103,183.40, covering a diverse range of immunological questions from several fields including oncology, neuroscience, rheumatology, transplantation and inflammation. Projects began in September 2018 and will be completed by the end of August 2019.

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						Other research interests include computational immunology, immuno-oncology, immunometabolism and translational immunology. In addition, work is being done on understanding the inflammatory response is crucial to inform rational treatment regimens and drug design to control this process. Inflammation is the body's natural response to clear infection but when uncontrolled in disorders such as IBD can have serious consequences for the host.
						Oxford Researchers, as part of an international collaboration have developed a vaccine that blocks the effects of the main cause of pain in osteoarthritis (nerve growth factor (NGF) in mice. This is the first vaccine of its kind in the world and if human trials are successful, would transform the lives of OA sufferers.
					Links also to the recent Oxford-Berlin initiative between UoO and 4 Berlin Universities. Grants are expected to be applied for by this partnership.	BRC work in Oxford includes Gastroenterology and Mucosal Immunology: Redefinition of gut, liver and skin disease based on molecular pathway analysis; Biomarker and target development; and Experimental Medicine trials
4	<b>Managing the epidemic of chronic disease</b>	Work with Big Data and development of digital tools to track patients in community, incl. congestive health failure. OUH and OH developing new pathways of care for e.g. COPD Type 2 diabetes, neurodegenerative diseases. Work will support development of digital approaches at scale across the Oxford AHSN region	Theme facilitates collaborative research on management of chronic diseases and its acute complications. Core component is development and evaluation of innovative technologies to improve care. Established the foundation for an HER-linked system for real time evaluation of individual's disease risks and personalised guidance. Large programme focusing on management of dyspnoea, one of commonest symptoms of chronic disease	Theme collaboration with George and Oxford Martin School to look at machine intelligence to treat chronic diseases. Deep Machine programme will use some of largest and most complex biomedical data sets ever collected. Community based work includes research into long term health conditions and gender and health research programme to look at differences in causes for chronic disease, including cardio-vascular disease.	The OX4 initiative led by OBU brings all partners together and aims to study long term conditions and care in OX4 district of Oxford which provides real life and socially diverse community within which to develop, trial and evaluate novel health and social care interventions, particularly in chronic disease management, community based and primary health care, transition between hospital and home and care of older people in all settings. In addition, SUPPORT-HF study measures impact of remote clinical management intervention with support for heart failure patients and GPs.	The Therapeutics for Ageing consortium (iTAc) is a national public-private partnership to accelerate the discovery & development of therapeutics for ageing. It will provide industry with a pipeline of novel clinically de-risked drug targets and assets, in a large and rapidly growing area of therapeutic need (age related morbidities). Expertise in 5 major complementary UK centres pooled to form the core of this initiative: The Francis Crick Institute, UoO (and partners Oxford AHSC, Oxford AHSN & Oxford BRC), University of Dundee, University of Birmingham & Birmingham Health Partners, & the Medicines Discovery Catapult. CCF funding with OxU (lead), Birmingham and Dundee – UK SPINE KE: is an award of £4.820m to support an open innovation approach across universities, NHS & business, to advance clinical research & medical innovation focused on improving health in old age.

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			Co-occurrence of several chronic conditions among individuals is increasing rapidly. Activities include Oxford Psychological Medicine group that has 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 of the study is to assess the impact of such proactive psychological care on early discharge.	Funds made available by BHF and MRC. Building on use of digital tools for self management of Diabetes and blood pressure.		Around 170 people attended a BRC event in March giving an opportunity to network and to hear about the breadth of research on chronic diseases such as diabetes, obesity, cardiovascular disease and dementia. This work is an active part of the Theme's work. The Chronic Disease Cluster, which brings together six research themes – Obesity, Multimorbidity, Diabetes, Neurology, Cardiovascular and Stroke – held the event at the UoO's Mathematics Institute. The research funded by the Oxford BRC was demonstrated by 60 posters each outlining a research study. OBU has recently undertaken a Stakeholder survey on Health Ageing in Oxfordshire and will be linking this into the Theme. OBU is developing its strategic response to the challenges and opportunities of the ageing society and has formed a cross-university, multi-disciplinary group which brings together world-leading experts in health and social sciences, the built environment, artificial intelligence technologies, and age diversity & managing extended working lives.
					An important milestone has been reached in the OBU led research project to help improve the lives of people with type 1 diabetes. Clinical trials will now begin for the four million EURO EU-funded PEPPER project which brings together leading European universities and companies. PEPPER, which stands for Patient Empowerment through Predictive PERsonalised decision support, aims to develop innovative tools to help people with diabetes who must make complex calculations to determine the correct insulin dose they need to administer.	Clinical trials will now begin for the €4M EU-funded PEPPER project which brings together leading European universities and companies. It aims to develop innovative tools to help people with diabetes determine the correct insulin dose. PEPPER's objective is to go beyond existing tools by offering a personalised decision-making support to simplify insulin dosage calculation. At the heart of the solution are two algorithms processing large amounts of data collected in real time via wearable devices like activity bands and continuous glucose monitors. This requires them to test glucose levels, factor in the amount of carbohydrates consumed, and account for the impact of a myriad factors including physical activity, stress, and illness, among others.
5	<b>Emerging infections and antimicrobial resistance</b>	New tools in molecular microbiology being developed for faster identification of pathogens and tracking of pathogens in populations. Application of genomic techniques for Hep C, TB and HIV well established - protocols being developed for application to for example MRSA and <i>C.diff</i> . Collaboration between UoO and Pirbright for pathogens that have animal reservoirs. Ebola virus vaccines work underway and UoO will establish drug discovery programme for pathogens associated with antimicrobial resistance.	Global work including Rapid Assessment of Potential Interventions and Drugs for Ebola in West Africa. Led to development o clinical trials of two experimental drugs for Ebola in Liberia and Sierra Leone. Data from studies is available for download. Investigatory expertise at UoO, working with PHE and others, to support management of outbreaks and epidemics and development of trials. Training is available and covers, planning, methodology, data management and ethics. Studies also in place on acute respiratory infections, arbovirus compatible febrile illnesses and paediatric acute infections	Clinical trials on Ebola published. Pan-European study now recruiting across 8 countries. Oxford leading several operational research programmes in the UK PH Rapid Support Team. Training being given in Uganda with WHO. Theme lead chairs the International SARIC. Data being collected with Chinese on Hand, Foot and Mouth disease. Jenner Institute is using replication-deficient viral vectors to develop vaccines against emerging pathogens. Phase I trials planned for MERS, RVF, Zia and Chikungunya. MERS partners in Saudi Arabia. RVF will move into clinical studies in Uganda. (animals and livestock) Work on quinolones in <i>C. diff</i> epidemic in UK published in Lancet. Good progress being made in identification of genomics variations conferring antituberculosis drug resistance in TB. Work also being done in <i>Neisseria gonorrhoeae</i> - patient involvement, animals, riverine and sewage etc.	Continued work on European and global impact - a number of studies including PREPARE and plans in place for building European wide sustainable clinical research network for infectious diseases with focus on antimicrobial resistance and epidemic infectious diseases. EDCTP and ALERRT also underway. Oxford members were deployed in pulmonary plague outbreak in Madagascar and Lassa fever outbreak in Sierra Leone. Jenner Institute is using replication-deficient viral vectors to develop vaccines. MERS vaccine work continues with trials in Oxford and Saudi, and vaccines for RVF and Chikungunya. Vaccine against Zika being prepared for clinical trials. RVF programme will move into clinical studies in Uganda for humans and livestock.	Key work in the Oxford BRC is Modernising Microbiology and Antimicrobial resistance. <b>Overall aim:</b> Transform diagnostic microbiology with whole genome sequencing; Generating the full diagnostic and public health information faster and cheaper; Sequencing direct from the patient sample so we deliver precise antimicrobial treatment more swiftly <b>Overarching need:</b> We have implemented a full short-read sequencing-based diagnostic solution in the PHE/NHS for mycobacteria; Now we need to do it for more pathogens Work covers (inter alia) TB and other mycobacteria - Extended resistance/susceptibility prediction catalogue using 10,209 isolates from 16 countries (NEJM 2018); <i>Neisseria gonorrhoea</i> - development of diagnostic tool

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SUMMARY OF ACTIVITIES

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			<p>The Modernising Medical Microbiology Consortium funded by the Oxford BRC, 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. ☒</p>			<p>Clinical and research teams at OUH, using best practice in infection prevention and control, whole genome sequencing and electronic patient data, halted an outbreak of a potentially deadly fungal pathogen after detecting that multi-use patient equipment was responsible. The breakthrough at the JR is significant as this is the first time an outbreak of Candida auris (C. auris) has been completely ended with a clear understanding of the cause. The UK's first dedicated Vaccines Manufacturing Innovation Centre (VMIC), announced by Business Secretary Greg Clark MP, led by the UoO's Jenner Institute, has been awarded funding by UK Research and Innovation of £66 million through the UK Government's Industrial Strategy Challenge Fund (ISCF) Medicines Manufacturing challenge. To be up and running by 2022, the VMIC addresses the UK's structural gap in late-stage vaccine manufacturing process development. It will allow development and manufacture of vaccines for clinical trials and at moderate scale for emergency preparedness for epidemic threats to the UK population.</p>
			<p>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 <math>\beta</math>-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.</p>			<p>Oxford BRC-funded researchers have pioneered new techniques using whole genome sequencing (WGS) for mycobacteria, including tuberculosis (TB), to identify particular bacteria causing infections, relatedness in contact/outbreak mapping, and resistance determinants to anti-tuberculosis drugs. These new techniques have proven far quicker than traditional techniques. WGS for TB is now rolled out nationally in the NHS through Birmingham, with implementation of an analysis and reporting pipeline through Oxford and integration with PHE. Oxford BRC-backed scientists are at the forefront of a landmark study that may herald a quicker, more tailored treatment for people living with tuberculosis worldwide. They demonstrated how our understanding of TB's genetic code is now so detailed that we can predict which commonly used anti-TB drugs are best for treating a patient's infection and which are not. The findings were announced at a special UN General Assembly session on TB. Oxford's pre-eminence in the field of anti-microbial resistance resulted in OUH and the BRC's of £1.8m capital funding.</p>



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6	Maintaining cognitive function in health and disease	OxDare building research capacity in dementia and cognitive health. Funds (Alzheimer's research UK) obtained for drug discovery institute in Target Discovery Institute. Key staff recruited. D-CRIS programme being implemented and leadership based in Oxford. UoO and OH working on master planning for Warneford - a key site in Headington Campus. Work on Oxford Centre for Human Brain Activity with multi modal imaging will start in July 2015. Engagement included seminar held at OBU	National initiatives (over £150m with collaborators) on Dementias Platform UK, UK Translational Research Collaboration in Dementia, ARUK UK Drug Discovery Alliance, Oxford Parkinson's Disease Centre' Innovative Medicines Initiative Grants, Motor Neurone Disease programmes, Warneford site is being developed as centre for translational research. Nursing research is being supported across all partners and the OxINAHR and NIHR CRF have recruited Senior Nursing Research Fellow	Success in new designation of BRC - OH and UoO - focus on dementia and mental health. Strong early translational research and experimental medicine integrated and co-located with later phase clinical research. Intending to enable self-management and outcome measures using digital technologies. Pipeline for delivery of new therapies in place with dedicated trail infrastructure. E.g. new treatments for anxiety, sleep, psychotic, depressive and fatigue therapeutic approached and informatics-driven technologies. Funds from a number of sources including Wellcome, MRC, NIHR and MQ. Developed biomarkers for Alzheimer's diseases - patented and licensed and commercialised. Oxford NIHR Funded Cognitive Health CRF renewed funding and works across three sites - university, the OUH and OH.	Comprehensive and fully integrated mental health research infrastructure being built with national and international elements. Clinical service and research integration proving strong for patient care advances. Pioneers the development and national implementation of scalable psychological therapies. Study on Comparative efficacy and acceptability of 21 antidepressants for acute treatment of adults was published in Lancet and shows how innovation in evidence synthesis can give robust, reliable evidence to guide patients and clinicians. Integrated infrastructure also enables us to combine routine clinical data with epidemiological and laboratory science and support drug discovery inter alia.	<b>Theme 6</b> Key in this theme has been the work of the OH BRC and its objective to establish an effective clinical interface for the BRC between basic research and clinical care. People across the SE England have been given access to a new digital treatment for insomnia as an alternative to sleeping pills. The Sleepio app, a digital cognitive behavioural therapy (CBT)-based programme that can be accessed via smartphone or the web, has been made available in Berks, Bucks and Oxon and will be rolled out across other areas in the South East in early 2019 - the first NHS rollout of direct-access digital medicine – fully automated, self-help programmes, easily accessible via app or web. The announcement came as the largest research trial into the impact of digital cognitive behavioural therapy (dCBT) on adults with insomnia demonstrated the link between better sleep and improved overall health. The research team from the UoO's Department of Clinical Neurosciences, supported by the NIHR Oxford BRC, led a 12-month study showing that Sleepio improved overall wellbeing, mental health and quality of life.
						A new method to model <b>neuroimaging data</b> could help to predict potential treatment outcomes for patients with mental health disorders. The study by researchers from Pompeu Fabra University, Spain, and UoO looked specifically at people with mental disorders attributable to diseases of the nervous system such as depression and addiction. The team involved used neuroimaging data of healthy participants who had been given LSD (lysergic acid diethylamide) and placebo treatments to prove the concept of the new computer mode The team responsible for implementing a unique model of physical and mental health care at OUH has been shortlisted for Team of the Year by the Royal College of Psychiatrists. The Integrated Psychological Medicine Service team has been recognised for delivering a novel way of providing psychiatric and psychological care to people who are physically ill.
						A Lancet Psychiatry study shows that automated <b>virtual reality</b> (VR) psychological therapy is effective against fear of heights which is a significant problem for one in five people. VR has been used in the past for phobias, but has always required a therapist to guide the user through the treatment. A team led by Prof Daniel Freeman, OH consult. psych. & researcher at UoO, has developed a VR prog. in which therapy is delivered by a computer-generated virtual coach. Treatment is personalised, with users able to interact with the virtual coach using voice recognition technology. Prof Catherine Harmer & team at OH BRC have developed a test to understand how antidepressants work. The test measures the way patients respond to -ve, +ve and ambiguous images of human facial expressions in 1st week of treatment. When tested people with depression will demonstrate a negative bias in their assessments of these images, while those with less severe depression will interpret the expressions more positively. Responses can change v. quickly and are a highly promising indicator of how a patient will respond to an antidepressant in the longer term.

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SUMMARY OF ACTIVITIES

#	Theme	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
	<b>Contributions to economic growth</b>	<p>Isis/UoO spun out 5 companies (£35m) and ten potential spinouts in therapeutics/vaccines and 8 in MedTech/digital space.</p> <p>UuO has over £20m in collaborative funding secured with UCB, Bayer, Merck, Pfizer, and Novo Nordisk.</p> <p>Bioescalator funds secured for Churchill site - new model to support spinouts and start ups.</p> <p>Highlights importance of research driving economic growth and enabling collaborations</p> <p>SGC has pioneered open innovation in drug discovery. Additional funds in 2014 for novel dementia targets, human immune assays and TEPs in oncology, metabolic and neuropsychiatry.</p> <p>Extending pre-competitive boundary from research to clinical development being explored with potential investors and partners</p>	<p>Work on BioEscalator continuing</p> <p>Other points to date:</p> <p>14 new companies developing medical technologies created since AHSC inception.</p> <p>£78.1 million of seed and follow on investment raised by these companies</p> <p>6 additional medical sciences companies have offers of investment and are expected to complete formation this financial year</p> <p>20+ further medical sciences companies in the pipeline</p> <p>On track to significantly exceed AHSC target of 15 in 5 years from Oxford University alone</p> <p>OSI has unquestionably had a catalytic effect and increased interest from wider investment community.</p>	<p>2014 5 spinouts - NightstarX, Genomics, Oxsonics, Deontics and OxSyBio raising £68m</p> <p>2015 5 spinouts - iOx, Xerian healthcare, OxEML, Orbit Discovery and Oxford Endovascular raising £6m</p> <p>2016 15 spinouts incl. Zegami, Vaccitech, EvOx, Argonout raising £47m</p> <p>2017 YTD 3 spinouts - ProMapp, Scenic Biotech and SpyBiotech raising £8M</p> <p>Total exceeds plans for AHSC from 2014.</p>	<p>A number of companies secured additional funding including Vaccitech, OxSyBio, Oxford Vacmedix, Oxford Nanopore - the latter already one of UK's few billion-dollar set ups and is valued at £1.5 billion. Adaptimmune and Immunocore also have valuations of £1 billion +</p>	<p>Joint meeting with CUHPs held in October and common interests identified and differences recognised.</p> <p>AHSC COO attended meeting in Jan 19 on the development of the Oxbridge expressway/corridor with all universities across the corridor.</p> <p>Importance of stronger links recognised e.g. with Milton Keynes - for both health and economic developments. Regular updates have been provided to the Board by Linda King and David Evans from OBU</p> <p>LEPs reminded of the importance of the health sector across the corridor and impact on academia and life sciences industries</p> <p>A further meeting has been planned for the Spring/Autumn of 2019.</p>
			<p>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.</p>			<p>In Aug 2018 Sensyne Health had an IPO on AIM raising £60m. In Jan 2019 Novartis signed a five-year collaboration with the BDI to establish a world-leading research alliance to improve drug develop't by making it more efficient and more targeted. Using AI &amp; advanced analytics, the partners expect to transform how ultra large and multiple datasets are analysed, combined and interpreted to identify early predictors of patient responses to treatments for inflammatory diseases, such as multiple sclerosis and psoriasis.</p>
						<p>Publication of additional data in the NEJM in 2016 provided evidence that the effect of the choroideremia gene therapy was sustained over many years, and the initiation in 2017 of a first-in-man Phase 1/2 clinical trial of a gene therapy for X-linked retinitis pigmentosa (XLRP). Nightstar, working with OUI, became a publicly traded company listed on the NASDAQ stock exchange with a market capitalisation in excess of \$500m. In early 2018, Nightstar started an international Phase 3 choroideremia gene therapy trial. This study, will recruit 140 participants in 6 countries, is the largest gene therapy trial in the world to date. Publication of the successful results of the initial Phase 1 study in Nature Medicine in late 2018, led to acquisition of Nightstar by Biogen for \$877m in early 2019.</p>

OXFORD ACADEMIC HEALTH SCIENCE CENTRE

2014 TO 2019

SUMMARY OF ACTIVITIES

#	Theme	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
						<p>OUI launched over 20 spinouts during this reporting period with six in Q4 of 2018 alone focused on health and 76 licences granted for supporting clinical outcomes assessment programme. The success of OUI sees the total investment received by their companies now exceed £2bn. Oxford Expression Technologies (which was spun out of OBU in 2007) in May 2018 won grants valued at over £2m from Innovate UK and the Newton Fund to develop a vaccine for a tropical viral disease (Crimean Congo Haemorrhagic Fever) and a novel therapy for Type 1 Diabetes based on pancreatic islet transplantation with partners in the UK and Mexico. As a result, OBU is now in the Top 10 of universities nationally for grants won by spin-out companies. The antibody portfolio developed by Professor Nigel Groome over a period of nearly twenty years from the early 1990s continues to yield an impressive licencing income, which has now grown from £1.8m in 2013-14 to over £3.5m in 2018. Clinical applications include pre-natal OBU has been ranked in the Top 10 of universities nationally for the past five years for income from intellectual property.</p>
	<b>Progress on e-Health platform</b>	<p>OUI and OH have extended their digital platforms in EPR. OH has extended True Colours in monitoring a number of mental health conditions. OUI established its Cerner p platform and looking to expand into range of therapeutic modules</p>	<p>Work continuing on digital Road Map and partners include the Oxford Councils, the STP and the CCG.</p>	<p>GDE cluster in development and aiming to work across Oxfordshire allowing health and social care to integrate. Both OUI and OH developing their electronic platforms - aim to lead to of course</p>	<p>Number of projects include LHCRE building on ICSs and GDEs and outstanding research capacity in the 2 BRCs, BDI, UK-CRIS and other initiatives. Apps including True Colours are being extended and development, OUI is central to records sharing through the Oxfordshire Care Summary. The 2 BRCs have significant interests in Big Data, informatics and e-Health platforms across care boundaries, UoO leads IMI-European Medical Information Framework. Oxford is one of six sites for Health Data Research Institute building on track records with funding from HDRUK. Thames Valley and Surrey work will join up records sharing, consistency of digital services, Apps and coordinated connections and provide access to large scale population health management capabilities and support leading edge research. Specific clinical pathways include cancer, maternity and EIP.</p>	<p>Academically, Oxford has been at the leading edge of big data and clinical informatics for many years and has in place physical and intellectual infrastructure to continue growth in this area. Our NHS providers have been collaborating with the universities and their investments in digitisation of the healthcare environment led, in 2016, to both hospitals being designated as Global Digital Exemplars by NHSE. National recognition of the Oxford NHS ecosystem was then complemented by the awarding of MRC HDR funding to Oxford (the largest single site). More recently, NHS partners alongside the NHS providers in the Oxford AHSN region have received support from NHSE as a LHCRE, further enhancing the connections across the region and the ability to use data or research.</p> <p>OH BRC has continued to build national collaboration with UK-CRIS, including (in consultation with NIHR) the development of a sustainability plan for this world-leading asset. The spin-out of CRISTAL Health – a new company - will complete in May 2019. It continues to build links with Big Data Institute, Alan Turing Institute and have attracted international funding.</p>

OXFORD ACADEMIC HEALTH SCIENCE CENTRE

2014 TO 2019

SUMMARY OF ACTIVITIES

#	Theme	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
	Inter-professional training and education		<p>Establishment of OxINAHR at OBU in collaboration with OUH, UO OH, NHS Health Education England (HEE) and UO Clinical Academic Graduate School. Led by Prof Debra Jackson, OxINAHR will undertake world class research and evidence-based practice that will produce knowledge to enhance the health and well being of the population of Oxford, Oxon 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. ☒</p>	<p>OBU also provides BSc in Paramedic Science and, inter alia a MSc in Applied Sport and Exercise Nutrition.</p>		<p>OSNM appointed Dr Mary Malone as Director and Prof Paul Carding as Director of the Research of OxINMAHR. Both bodies are AHSC partnership initiatives and these new appointments act to deepen joint working.</p> <p>OxAHSC and King's AHSC are collaborating on the learning and education portal and will produce and provide modules for teaching and research. OxAHSC will be able to access current portal content for the benefit of all students and health professionals.</p> <p>OBU has retained its HR Excellence in Research Award from the European Commission for the sixth year. The award recognises the University's long-term commitment to supporting the personal, professional and career development of its research-active staff. Oxford Brookes first received the award in 2012 and retained it in 2016 after a four-year review. A further review, involving researchers from across the University, has seen Oxford Brookes retain the award once more.</p> <p>The HR Excellence in Research Award is an important mechanism for implementing the principles of the Concordat to Support the Career Development of Researchers.</p>
			<p>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. there are now about 425 Magnet recognised health care organisations worldwide.</p> <p>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.</p> <p>The AHSC-partnered MSc Medical Genetics and Genomics started in at OBU 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).</p>			

OXFORD ACADEMIC HEALTH SCIENCE CENTRE

2014 TO 2019

SUMMARY OF ACTIVITIES

#	Theme	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
	<b>Governance and leadership</b>	Governance arrangements were reviewed in Jan 2015 and agreed that these provided for light touch, flexibility and agility. OUH CEO retired in October 15 and appointment of Dr Bruno Holthof announced. (OUH hosts AHSC)	Dr Bruno Holthof joins the OUH as Chief Executive in October 2015	Professor Alastair Buchan left the AHSC Board having stepped down as Head of Medical Sciences Division and Professor June Girvin has retired from Oxford Brookes and has been succeeded on the Board by Professor Linda King, Pro Vice Chancellor for Research and Global Partnerships. Prof Chris Kennard is acting Head of Medical Sciences until a substantive appointment is made.	Oxford Academic Health Partners established as a Registered Charity with the AHSC Board acting as Trustees. Reg No: 1174725 Professor Gavin Screaton appointed as Head of Medical Sciences Division at the University of Oxford and joined the Board of the AHSC (and the Board of the OUH replacing Professor Sir John Bell)	Directors of Oxford CLAHRC/MIC invited to join the Board ensuring full integration across partners in Oxfordshire and beyond. The outcome of the recent NIHR accreditation process for ARCs is awaited (ARC successor body to CLAHRCs)



Department  
of Health &  
Social Care

## DEPARTMENT OF HEALTH & SOCIAL CARE DESIGNATED ACADEMIC HEALTH SCIENCE CENTRE (AHSC)

### 2018/19 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 & Social Care Academic Health Science Centre:** Oxford Academic Health Science Centre

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

**Name:** Sir John Bell

**Job Title:** Regius Professor and Chair, Oxford Academic Health Science Centre

**Address:** Richard Doll Building  
Old Road Campus  
Roosevelt Drive, Headington  
Oxford OX3 7DG

**E-mail:** regius@medsci.ox.ac.uk

**Tel:** 01865 289 782

#### Abbreviations

OUH - Oxford University Hospitals NHS FT  
JR John Radcliffe

OBU - Oxford Brookes University

OSNM - Oxford School of Nursing & Midwifery

OxINMAHR - Oxford Institute for Nursing, Midwifery and Allied Health

OH - Oxford Health NHS FT

UoO - University of Oxford

BDI Big Data Institute

OUI Oxford University Innovation

RIOG – Research and Innovation Oversight Group

OUH BRC – NIHR Oxford University Hospitals BioMedical Research Centre

OH BRC – NIHR Oxford Health BioMedical Research Centre

LHCRE - Local HealthCare Record Exemplars

PEPPER - Patient Empowerment through Predictive PERsonalised decision support

OCC – Oxfordshire County Council

MOU - Memorandum of Understanding

## 2. OVERVIEW OF ACTIVITIES

**Please provide a brief overview of activities for your AHSC for 2018/19 financial year, addressing the following points: progress with further aligning the strategic objectives of the NHS provider(s) and university(ies) in order to harness and integrate world-class research, excellence in health education and excellence in patient care;**

To coordinate the research & innovation infrastructure across the AHSC the RIOG has been constituted as a committee of the AHSC. RIOG is responsible for coordinating and overseeing strategic and scientific direction of collaborative research undertaken by AHSC partners and for promoting and improving the 'pull through' of research from basic discovery to translation, evaluation and implementation leveraging resources such as the NIHR infrastructure. RIOG will also provide the forum for the partnership to identify innovations that address priorities for AHSC and support the further development or evaluation of those innovations to promote their adoption into practice involving the NIHR BRCs, the CLAHRC & the MIC. The plans for the development of the Warneford site are continuing apace with the signing of a joint Memorandum of Understanding between NHS, University and Donor and the creation of a Joint Vehicle. The JV will develop Warneford Park with integrated clinical services, research and commercial space – and a new Oxford College.

OSNM appointed Dr Mary Malone as Director and Prof Paul Carding as Director of the Research of OxINMAHR. Both bodies are AHSC partnership initiatives and these new appointments act to deepen joint working. More to be found on all aspects at [www.oxfordahsc.org.uk](http://www.oxfordahsc.org.uk)

**A summary of the progress against the specific short, medium and long-term objectives as detailed in your full stage application, and a brief summary of progress made in each of the approved themes / work programmes for the AHSC as detailed in the full application;**

**Updates on each theme below:**

**T1 Big Data:** The UoO through Prof Martin Landray will lead a **sprint exemplar project** to use NHS data to accelerate recruitment into clinical trials and increase the opportunities for NHS patients to participate in research. This project will enable researchers to work with the NHS and industry partners to accelerate clinical trial recruitment and provide answers to important research questions more rapidly. This project will develop a system that uses the 'hospital episodes' information to identify potentially suitable patients from across the country who could be asked if they wish to take part in clinical trials. Oxford is to be home to one of the five new technology centres across the country and is also a collaborator in two of the other Centres, with local activities integrated within the BDI. The centre that will be led by the UoO is the National Consortium of Intelligent Medical Imaging (**NCIMI**), in which UK Research and Innovation is investing £10 million. The NCIMI will benefit from a further £5 million of funding provided from its commercial partners. OUH is one of the NHS trusts that will be part of the consortium, which will include large commercial partners, such as GE Healthcare and Alliance Medical, local SMEs and university spin-out companies, as well as charities and patient support groups. Clinical and research teams at OUH, using infection prevention and control best practice, whole genome sequencing and electronic patient data, have halted an outbreak of a potentially deadly fungal pathogen after detecting that multi-use patient equipment was responsible. The breakthrough at the John Radcliffe Hospital is significant as this is the first time an outbreak of *Candida auris* (*C. auris*) has been completely ended with a clear understanding of the cause.

**T2 Industry interactions: TheHill** is a digital health innovation network at the nexus of the Oxford NHS Trusts, UoO, OBU, the local digital community with links to London and across the Thames Valley and is Chaired by a representative of the AHSC partnership. TheHill formally relaunched on 13 February 2019 with support from partners including the AHSC and particularly the Oxford AHSN. It was created to address the challenge of identifying and developing emerging innovations that arise from daily practice in the NHS, research in the academia and inspired ideas from individuals and teams. Workshops on User-Centred Design and Economic Evaluations have been oversubscribed and more than 40 attended the social mixer. It guides innovators through a development pipeline to implement solutions which are commercial and impactful; transforming care and improving the lives of patients and healthcare professionals. Seconded experts-in-residence work with the steering committee, project managers and administration team to provide expertise and mentoring for SMEs. For more about the network visit: [www.thehill.co](http://www.thehill.co). OUH and **Sensyne Health** are pioneering an approach to co-creation of value in the use of NHS data sets. Sensyne Health entered into a Strategic Research Agreement (SRA) with OUH under which the two will strengthen and expand their collaboration to include the analysis of anonymised genetic data. Under the new agreement, OUH will receive an additional £5m in equity in Sensyne Health and will also benefit from royalties that arise from any discoveries. At the Cerner international conference in Kansas, OUH and Cerner announced their intention to establish a centre for open API technologies in Oxford. This centre will capitalise on the Cerner Ignite API (FIHR based) that has gone live at OUH, to allow rapid testing and evaluation of digital health technologies, and where appropriate deployment. The open API standard reduces implementation time and promotes agile uptake of new solutions. The standard is compatible with NHS policy and therefore offers companies the potential for national roll out as well as international reach via the Cerner client base.

**T3 Modulating the Immune Response** the **Immunology Network** has driven the development of a Human Immune Discovery Initiative (**HIDI**), an initiative that aims to improve accessibility to immunological assays and expertise for all researchers across Oxford. The HIDI Internal Fund is currently supporting 18 projects within six University departments, at a total cost of £176,730.31, covering a diverse range of immunological questions from several fields including oncology, neuroscience, rheumatology, transplantation and inflammation. HIDI has been instrumental in facilitating collaboration across research areas and the development of standardised, reproducible assays. Other research interests include computational immunology, immuno-oncology, immunometabolism and translational immunology. In addition, work is being done on understanding the inflammatory response is crucial to inform rational treatment regimens and drug design to control this process. Inflammation is the body's natural response to clear infection but when uncontrolled in disorders such as IBD can have serious consequences for the host. The Cluster has integrated the work of **CHERUB** ('Collaborative HIV Eradication of Reservoirs: UK BRC'), a cooperative of researchers, clinicians and patients across the Universities and NHS Trusts of Oxford, Cambridge, UCL, Kings and Imperial founded in 2006. Since April 2018, through **CHERUB**, the Oxford BRC been recognised in authorship in six peer-reviewed publications, including Nature, Science Immunology and Frontiers Immunology and multiple national and international conference abstracts. Led by John Frater, **CHERUB** runs collaborative studies from basic laboratory research and assay development to RCTs. Oxford Researchers, as part of an international collaboration have developed a vaccine that blocks the effects of the main cause of pain in osteoarthritis (nerve growth factor (NGF) in mice. This is the first vaccine of its kind in the world and if human trials are successful, would transform the lives of OA sufferers.

**T4 Chronic Disease.** Around 170 people attended a BRC event in March 2018 that provided an opportunity to network and to hear about the breadth of research taking place in Oxford to combat chronic diseases such as diabetes, obesity, cardiovascular disease and dementia. This work is an active part of the Theme's work. The **Chronic Disease Cluster**, which brings together six research themes – Obesity, Multimorbidity, Diabetes, Neurology, Cardiovascular and Stroke – held the event at the UoO's Mathematics Institute. The breadth of the research funded by the Oxford BRC was demonstrated by 60 posters each outlining a research study. **UK SPINE** conference to be held in April 2019 was organised with the support of the AHSC celebrating its first year of work. The UK Spine is a national network of research and clinical collaborators focused on developing new medicines to support healthy ageing and includes Oxford, Birmingham, Dundee, the Crick and the Medicines Discovery Catapult. Aligned with the UK Life Sciences Industrial Strategy, the UK Spine will contribute to developing the UK as a global hub for clinical research and medical innovation through strong partnerships between academia, industry and the charitable sectors. OBU has recently undertaken a Stakeholder survey on **Health Ageing in Oxfordshire and** will be linking this into the Theme. OBU is developing its strategic response to the challenges and opportunities of the ageing society and has formed a cross-university, multi-disciplinary group which brings together world-leading experts in health and social sciences, the built environment, artificial intelligence technologies, and age diversity & managing extended working lives. Clinical trials will now begin for the €4M EU-funded **PEPPER** project which brings together leading European universities and companies. It aims to develop innovative tools to help people with diabetes determine the correct insulin dose. **PEPPER's** objective is to go beyond existing tools by offering a personalised decision-making support to simplify insulin dosage calculation. At the heart of the solution are two algorithms processing large amounts of data collected in real time via wearable devices like activity bands and continuous glucose monitors. This requires them to test glucose levels, factor in the amount of carbohydrates consumed, and account for the impact of a myriad factors including physical activity, stress, and illness, among others. **OxAHSC** will be collaborating with the UoO, OUH, OBU King's College London and the OCC Obesity team to undertake a series of workshops and literature reviews into the use of the internet of things to promote healthy diet and exercise in children and developing a free set of tools for schools and families. The short programme of work was designed by Drs Pink, Wells and Jani, is funded by the **PITCH-IN project** (Research England CCF funding to Sheffield). **Support HF**, a product that has been in development since the inception of OxAHSC, that enables heart failure patients to understand and monitor their condition and take control of their treatment in their own homes, has been acquired by Sensyne Health Plc. This follows a 30-month clinical trial of 202 patients and six years of support in Oxford. New OBU research is to focus on the world's first online intervention specifically for parents of children with epilepsy experiencing sleep issues. This is part of one of the largest ever clinical trials in children with epilepsy which aims to find out which treatment approach works best for children and their families. The nationwide **CASTLE** project involves clinicians and researchers from institutions in the UK and overseas, including OBU, and is one of the only trials to compare antiepileptic drugs against active monitoring with no medication.

**T5 Emerging Infections** Clinical and research teams at OUH, using infection prevention and control best practice, whole genome sequencing and electronic patient data, have halted an outbreak of a potentially deadly fungal pathogen after detecting that multi-use patient equipment was responsible. The breakthrough at the JR is significant as this is the first time an outbreak of *Candida auris* (*C. auris*) has been completely



ended with a clear understanding of the cause. The UK's first dedicated **Vaccines Manufacturing Innovation Centre (VMIC)**, announced by Business Secretary Greg Clark MP, led by the UoO's Jenner Institute, has been awarded funding by UK Research and Innovation of £66 million through the UK Government's Industrial Strategy Challenge Fund (ISCF) Medicines Manufacturing challenge. To be up and running by 2022, the VMIC addresses the UK's structural gap in late-stage vaccine manufacturing process development. It will allow development and manufacture of vaccines for clinical trials and at moderate scale for emergency preparedness for epidemic threats to the UK population.

The International Severe Acute Respiratory and emerging Infections Consortium (**ISARIC**) has been awarded £4.5 million to accelerate clinical research to prevent illness and deaths from epidemic infectious diseases. ISARIC - whose Global Support Centre is hosted by the UoO - is a world-wide, grass-roots consortium of clinical research networks, working together on epidemic infections such as pandemic influenza, Ebola, Lassa fever, and plague. With this funding, ISARIC will implement a series of initiatives including collaborative inter-epidemic research studies, pre-positioning of 'epidemic' research protocols, responsive research during outbreaks, career development fellowships and training. The **mobile malaria project** took place led by UoO researchers travelling 6,300km across Namibia, Zambia, Tanzania & Kenya to investigate the challenges facing those on the front line of malaria control in Africa – where 90% of the world's cases occur. Driving a specially equipped Land Rover Discovery, the team evaluated portable DNA sequencing technology in collaboration with African research centres, to better understand how the technology can be used in different locations. This will provide important information about malaria parasite and mosquito populations, including drug and insecticide resistance. **Oxford BRC-funded** researchers have pioneered new techniques using whole genome sequencing (WGS) for mycobacteria, including tuberculosis (TB), to identify particular bacteria causing infections, relatedness in contact/outbreak mapping, and resistance determinants to anti-tuberculosis drugs. These new techniques have proven far quicker than the laborious and time-consuming techniques used in traditional microbiology labs. WGS for TB is now rolled out nationally in the NHS through the Regional Centre for Mycobacteriology (RCM) at Birmingham, with implementation of an analysis and reporting pipeline through Oxford and integration with Public Health England. During the year, Oxford BRC-backed scientists were at the forefront of a landmark study that may herald a quicker, more tailored treatment for people living with tuberculosis worldwide. They demonstrated how our understanding of TB's genetic code is now so detailed that we can predict which commonly used anti-TB drugs are best for treating a patient's infection and which are not. The findings were announced at a special **UN General Assembly session on TB**. Oxford's pre-eminence in the field of anti-microbial resistance resulted in OUH and the BRC being awarded **£1.8 million in capital funding by the DHSC** to expand its work to not only target common diseases for which antibiotics are often unnecessarily prescribed, but also to develop new vaccines that can tackle AMR in the NHS. The funding boosted Oxford's 'genome sequencing pipeline' with the purchase of: three genetic sequencing machines; powerful computers to analyse the results; two flow cytometers that allow for multiple samples to be analysed simultaneously; and robots that automate the process of extracting DNA and RNA from samples from clinical vaccine trials.

**T6 Cognitive Health** - Key in this theme has been the work of the Oxford Health BRC and its objective to establish an effective clinical interface for the BRC between basic research and clinical care. Partnership with the AHSN has also been strong in this Theme. People across the SE England have been given access to a new digital treatment for insomnia as an alternative to sleeping pills. The **Sleepio** app, a digital cognitive behavioural therapy (CBT)-based programme that can be accessed via smartphone or the web, has been made available in Berks, Bucks and Oxon through the Oxford AHSN and will be rolled out across other areas in the South East in early 2019 - the first NHS rollout of direct-access digital medicine – fully automated, self-help programmes, easily accessible via app or web. The announcement came as the largest research trial into the impact of digital cognitive behavioural therapy (dCBT) on adults with insomnia demonstrated the link between better sleep and improved overall health. The research team from the UoO's Department of Clinical Neurosciences, supported by the Oxford BRC, led a 12-month study showing that Sleepio improved overall wellbeing, mental health and quality of life. A new method to model **neuroimaging data** could help to predict potential treatment outcomes for patients with mental health disorders. The study by researchers from Pompeu Fabra University, Spain, and UoO looked specifically at people with mental disorders attributable to diseases of the nervous system such as depression and addiction. The team involved used neuroimaging data of healthy participants who had been given LSD (lysergic acid diethylamide) and placebo treatments to prove the concept of the new computer mode. The team responsible for implementing a unique model of physical and mental health care at OUH has been shortlisted for Team of the Year by the Royal College of Psychiatrists. The Integrated Psychological Medicine Service team has been recognised for delivering a novel way of providing psychiatric and psychological care to people who are physically ill. A Lancet Psychiatry study shows that automated **virtual reality (VR)** psychological therapy is effective against fear of heights. Fear of heights is a significant problem for one in five people at some point in their lives, and most never receive treatment. Although VR has been used in the past for phobias, it has always required a therapist to guide the user through the treatment. Now a team led by Professor Daniel Freeman, OH consultant psychiatrist and researcher at UoO's Dept. of Psychiatry, has developed a VR programme in

which psychological therapy is delivered by a computer-generated virtual coach. Treatment is personalised, with users able to interact with the virtual coach using voice recognition technology. Prof Catherine Harmer and her team at OH BRC have developed a pioneering test bringing a new understanding of how antidepressants work. The test measures the way patients respond to negative, positive and ambiguous images of human facial expressions within the first week of antidepressant treatment. When tested people with depression will demonstrate a negative bias in their assessments of these images, while those with less severe depression will interpret the expressions more positively. These responses can change very quickly and are a highly promising indicator of how a patient will respond to an antidepressant in the longer term. It has also been shown that the more the test reveals positive responses, the more effective the medication is likely to prove.

**Summary of AHSC's contribution to economic growth and the economy, including through partnerships with industry;** In Aug 2018 **Sensyne Health** had an IPO on AIM raising £60m. In January 2019 Novartis signed a five-year collaboration with the BDI to establish a world-leading research alliance that will improve drug development by making it more efficient and more targeted. Using artificial intelligence (AI) and advanced analytics, the partners expect to transform how ultra large and multiple datasets are analysed, combined and interpreted to identify early predictors of patient responses to treatments for inflammatory diseases, such as multiple sclerosis (MS) and psoriasis. After the publication of additional data in the New England Journal of Medicine in 2016 providing evidence that the effect of the **choroideremia gene therapy** was sustained over many years, and the initiation in 2017 of a first-in-man Phase 1/2 clinical trial of a gene therapy for X-linked retinitis pigmentosa (XLRP), Nightstar, working with OUI, became a publicly traded company listed on the NASDAQ stock exchange with a market capitalisation in excess of \$500 million. In early 2018, Nightstar commenced an international Phase 3 choroideremia gene therapy trial. This Phase 3 study, which will be recruiting 140 participants in 6 countries, is the largest gene therapy trial in the world to date. Following the publication of the successful results of the initial Phase 1 study in Nature Medicine in late 2018, Nightstar was acquired by Biogen for \$877 million in early 2019. **OUI** launched over twenty spinouts during this reporting period with 6 in the last quarter of 2018 alone focused on health and 76 licences granted for supporting clinical outcomes assessment programme. The success of OUI sees the total investment received by their companies now exceed £2bn. Oxford Expression Technologies (which was spun out of OBU in 2007) in May 2018 OET won grants valued at over £2m from Innovate UK and the Newton Fund to develop a vaccine for a tropical viral disease (Crimean Congo Haemorrhagic Fever) and a novel therapy for Type 1 Diabetes based on pancreatic islet transplantation with partners in the UK and Mexico. As a result, OBU is now in the Top 10 of universities nationally for grants won by spin-out companies. The antibody portfolio developed by Professor Nigel Groome over a period of nearly twenty years from the early 1990s continues to yield an impressive licencing income, which has now grown from £1.8m in 2013-14 to over £3.5m in 2018. Clinical applications include pre-natal OBU has been ranked in the Top 10 of universities nationally for the past five years for income from intellectual property. Economic growth and development of collaborative partnerships has been subject of meetings between the AHSC, the Cambridge University Health Partners and the Oxford and Eastern AHSNs. Areas covered included clinical research and innovation and the use and development of data for a variety of purposes including research. This work has great potential and links to the development of the **OxBridge** corridor/expressway – work that all universities in this region are already engaged in. The corridor development has potential in terms of housing especially for key workers in health and academia.

**e-Health informatics;** OUH & OH are partners in the first wave of five **LHCRE** awarded in June 2018. LHCRE is a regional collaboration across health, care and local authorities to develop shared health and care records for the people in their region. It will deliver shared records for improving and coordinating individual care so that data can be shared on behalf of patients regardless of their location within the region. The Thames Valley and Surrey LHCRE has selected Graphnet to provide this infrastructure. OH BRC has continued to build national collaboration with UK-CRIS, including (in consultation with NIHR) the development of a sustainability plan for this world-leading asset. The spin-out of **CRISTAL** Health – a new company - will complete in May 2019. It continues to build links with Big Data Institute, Alan Turing Institute and have attracted international leaders such as Prof Stephen Friend (ex-Apple, now Visiting Professor of Connected Medicine) to Oxford. **OxAHSC and King's AHSC** are collaborating on the learning and education portal and will produce and provide modules for teaching and research. OxAHSC will be able to access current portal content for the benefit of all students and health professionals.

**An overview of any significant developments or issues associated with the leadership, strategy and governance arrangements which might impact on the delivery of the aims and objectives of your AHSC.**

The NIHR CLAHRC & the NIHR MIC Directors, Richard Hobbs and Nick Butler, have joined the AHSC Board so linking up all key bodies within the AHSC. AHSC Board serves as Trustees for OAHF and the Plans and

Objects approved in November 2018. RIOG held 1st meeting in Feb 2019. The AHSC has ended its formal relationship with MedCity and continues to strengthen its relationships with Cambridge, the Midlands and the North

**David Walker** was appointed as the Chair of OH succeeding Martin Howell who completed his term of office on 31 March 2019. David was previously deputy chair of Central and North West London NHS FT. He is also a member of the Centre for Mental Health's Commission for Equality in Mental Health. His professional career spans journalism, research, marketing and public affairs.

**Professor Sir Jonathan Montgomery** was appointed Chairman of OUH on 1 April 2019 succeeding Dame Fiona Caldicott. He is Professor of Healthcare Law at UCL. He served on local NHS boards in Hampshire and the Isle of Wight for more than 20 years up to March 2013. Sir Jonathan was also a member of the panel of advisers to the Morecambe Bay Investigation, which reported in 2015, and has previously chaired the Advisory Committee on Clinical Excellence Awards, the Nuffield Council on Bioethics, and the Human Genetics Commission.

**The AHSC reviewed its work and themes in Feb 18** and changes were approved by the Board in June 2018. The theme structure has been developed to prepare for the next five years of partnership with a focus on translation and innovation plus greater alignment with major infrastructure across the partnership such as the two NIHR BRCs. Because of the successful investments in Oxford such as the Big Data Institute application of big data and clinical informatics tools is available to all themes, therefore **Theme 1** will be dissolved remaining as a key component of all themes. **Theme 2** will now be managed through RIOG; **Themes 3 & 5** will merge to become Immunity, Infection and Inflammation. The infection element includes the global work in Africa, SE Asia and the important local work on TB & bv0063 MRSA in OUH and UoO. **Theme 4** will now cover chronic disease, multi-morbidity and ageing. **Theme 6** remains focused on cognitive health but is expanded to include mental wellbeing. In addition, the proposed new larger three themes will have cross cutting components to include for example Big Data (see above), Clinical Research and Translation and Gene and Nucleic Acid Therapies.

AHSC Annual Report 2018/19 must be submitted via email, to the NIHR CCF Infrastructure mailbox: [ccf-infrastructure-team@nihr.ac.uk](mailto:ccf-infrastructure-team@nihr.ac.uk) copying the programme manager Charlotte Scott ([charlotte.scott@nihr.ac.uk](mailto:charlotte.scott@nihr.ac.uk)) by 1pm on **Monday 17<sup>th</sup> June 2019**.

The Annual Report aims to capture progress against the stated objectives, specific themes and work programmes as set out in your application, 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 print-out of the AHSC Annual Report 2018/2019 is required by the Department of Health and Social Care and should be sent to the following address to arrive no later than **Monday 1<sup>st</sup> July 2019**:

Charlotte Scott  
NIHR Central Commissioning Facility  
Grange House  
15, Church Street  
Twickenham  
Middlesex  
TW1 3NL

## APPENDIX 1

### Summary of the Oxford AHSC Activities from designation 1 April 2014 to 31 MARCH 2019