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

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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 (no more than 4 pages)

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. 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 & 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

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. 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. 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, thus providing an example of a technology that has completed a translation arc and is poised to deliver impact. 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. 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 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 and the Cambridge University Health Partners. 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 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 OAHP 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 copying the programme manager Charlotte Scott (charlotte.scott@nihr.ac.uk) by 1pm on **Monday 17th 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 1st July 2019**:

Charlotte Scott
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Grange House
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APPENDIX 1
Summary of the Oxford AHSC Activities from designation 1 April 2014 to 31 MARCH 2019