

Institution: University of Hull

Unit of Assessment: UoA 3

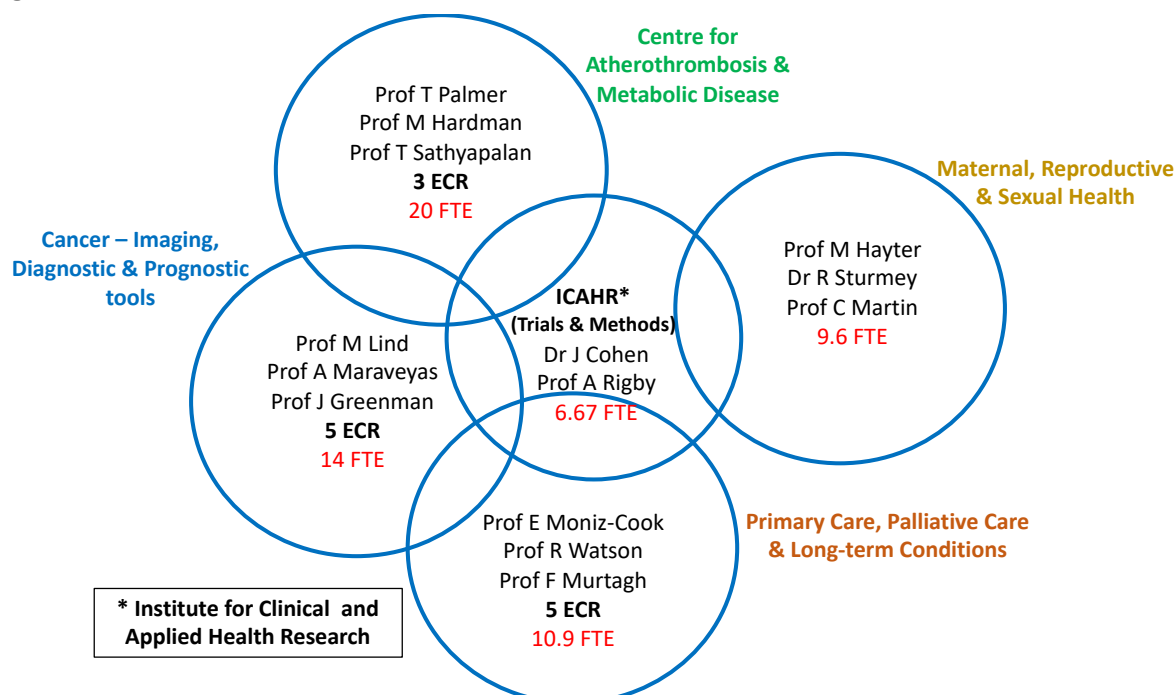
**1. Unit context and structure, research and impact strategy**

Over the past 6 years the University of Hull (UoH) has significantly increased its support for multidisciplinary, translational, healthcare research through substantial investment in staff and infrastructure, e.g. >£28m investment in its health campus, improvements in processes that enhance equality and diversity, and encouraging a vibrant research culture. Together, these actions enable impact to be effectively delivered.

During the REF period the University has undergone a major reorganization with the strategic aim of strengthening existing collaborations and facilitating focused investment in several new cross-cutting initiatives, e.g. Institute for Clinical and Applied Health Research (ICAHR) and the Wolfson Palliative Care Research Centre. The Faculty of Health Sciences (FHS) established in August 2017 encompasses all the Institution's healthcare research (Biomedical Science, Medicine, Midwifery, Nursing, Psychology, and Sports Health & Exercise). **A strength of healthcare research in Hull is the close working relationships across the health professions embracing staff at both the University and local acute NHS Trust**, the latter was renamed The Hull University Teaching Hospitals (HUTH) NHS Trust in 2019; reflecting the increased emphasis and value of the research partnership. This strong relationship benefits healthcare research at all levels and facilitates translation into practice for patient benefit.

The UoA3 submission comprises 63 members of staff (44% female/56% male; 60.17 FTE): 22 FTE Biomedical Scientists, 9.6 FTE Nursing and Midwifery staff, 18.45 FTE Clinicians and Clinical Psychologists (Hull York Medical School, HYMS) and 10.12 FTE Biostatistics & Clinical Trials staff. The submission is principally White Caucasian (87%) with BAME comprising 11% and 3% not known, and 9% are recorded as having a declared disability. UoH is committed to nurturing the next generation of research leaders and 13 staff within UoA3 submission (20%) are classified as early career researchers (ECRs). Healthcare research at Hull can be broadly classified under 5 multidisciplinary thematic areas that include staff from their various disciplines (Figure 1).

**Figure 1. Overview of healthcare research clusters at the University of Hull**



Each area is led by senior members of staff with established funding streams, and these provide a vibrant research ethos in which postgraduate students are trained in cutting-edge technologies and skills relevant to their project. Core equipment, masterclasses with leading national and

international guest speakers, seminars, and researcher exchange workshops are shared across the thematic areas, with staff and students being actively encouraged to work at the interdisciplinary boundaries.

**Institute for Applied and Clinical Health Research (ICAHR)** The Institute is based in the new Allam Medical Building at the heart of the University's £28-million investment in its health campus, and was opened by Her Majesty The Queen in November 2017. The purpose of our state-of-the-art institute is to develop and sustain a world-leading health research hub which supports a range of specialist research groups. The Allam Medical Building has excellent teaching and research facilities, >50 networked computers, bookable research rooms, and innovative breakout spaces, all of which have facilitated networking and generated a research "buzz". ICAHR comprises three core research groups (Academy of Primary Care, Maternal, Reproductive & Sexual Health, and Wolfson Palliative Care Research Centre) plus six collaborating research groups (the Cancer group - including TRANSFORM, Diabetes Endocrine & Metabolic group, Respiratory group, Social & Psychological Research into Long Term Conditions (SPARC) group, and the Vascular group). **As Figure 1 depicts ICAHR acts a central hub for much of the healthcare research at UoH. Since its launch in 2019, it has been highly successful in fostering new collaborative, interdisciplinary and multi-professional health research.** This success is evidenced in the Impact Case studies, particularly through collaborations across the Vascular and Metabolic groups (together with staff from the **Centre for Atherothrombosis and Metabolic Disease**), and across **Primary Care, Palliative Care & Long-term Conditions**, including dementia. The institute has expanded the range and success of funding achieved (including Research England, NIHR, ESRC and MRC funding) and, since 2019, ICAHR-supported researchers have brought £2.3 million to UoH. The Hull Health Trials Unit (HHTU) – launched in March 2019 – gained provisional registration to the UK Clinical Research Collaboration registered clinical trials unit network within 12 months. It is already supporting 7 clinical trials and 5 other studies, and provides regulatory-compliant information systems, a data capture framework and safe and secure storage, compliant with the NHS information governance toolkit standards. Researchers at all levels can access the expertise of ICAHR, the HHTU, and the Methods hub; these deliver advice on appropriate methods, funding sources, costing models, statistical advice, and networking opportunities, regionally and across the globe. Our Public and Patient Involvement and Engagement (PPIE) group (called 'Involve Hull') delivers PPIE co-design, co-production and engagement. The input from this lay group has been central to the development of many of the recent, successful, external funding bids.

**Maternal, Reproductive & Sexual Health (MaRH).** This cluster focuses on health risk behaviours and the psychosocial aspects of reproductive, sexual and maternal health and well-being. Pioneering research activity addressing nationally and internationally relevant areas such as: perinatal mental health; teenage pregnancy; alcohol-related harm and maternity care; and the interface between these areas is being undertaken. This research has direct relevance to contemporary clinical practice and service development. **The group's work has produced seminal findings on maternal well-being, in particular the development of mental health ratings tools and the Birth Satisfaction Scale-Revised (BSS-R); the latter is now used globally in 39 countries across 134 sites improving perinatal healthcare. The group have also undertaken work in India and Sub-Saharan Africa addressing adolescent reproductive/sexual and maternal health issues, funded by the Global Challenges Research Fund.** This collaborative study with secondary schools in Nigeria has benefited from UoH expertise in implementation of new healthcare measures. Another research theme has focussed on nursing interventions to address teenage pregnancy and work with school nurses in relation to sex education and sexual health promotion in schools. Research funded by the Institute of Alcohol Studies on implementation of alcohol guidelines in maternity care has informed the development of a practice-change intervention supporting midwives in explaining the serious issues associated with alcohol abuse during pregnancy. Continuation of this research has been funded by NIHR RfPB. Professor Lesley Smith is part of the Local Maternity Services (NE/Cumbria) Alcohol and Pregnancy Working Group, which works to improve prevention of alcohol-related harm during pregnancy; early results from this work helped inform the Commission on Alcohol Harm February 2020. The MaRH cluster has a flourishing PGR group (4 scholarships and 6 international students) engaged in research that includes maternal well-being, and co-development of interventions to

improve reproductive health whilst reducing gender-based violence, and alternative approaches to pain in pregnancy. The group have hosted visiting academics from China, Finland, Thailand and Uganda in the last 3 years, and is a good example of UoH's approach to building International, interdisciplinary collaborations.

**Primary care, Palliative care & Long-term Conditions** Chronic diseases have reached epidemic proportions and are the leading cause of death globally. More people are living longer with multiple conditions which, in addition to the significant socio-economic impacts, reduces quality of life and physical functioning while increasing mortality rates, hospital admissions, psychological distress and polypharmacy. The group's research responds directly to UK government priorities articulated in a range of policy frameworks including the NHS Long Term Plan (2019) and the Industrial Strategy Grand Challenge, 'Meeting the Needs of an Ageing Society' (2018). Hull's seminal working on managing behaviours associated with dementia is the subject of an **Impact Case Study**, *"Supporting carers with evidence-based interventions for behavioural care-challenges in dementia: tool-kits for service providers"*. The cluster has strong links with the NHS and attracts research funding (>£2.5M in the REF period) from a range of sources including the European Union Horizon 2020, the NIHR, ESRC and relevant charities such as Lupus UK. An ongoing Music and Mental Well-being project is using music to make a positive impact on the lives of older people. Through the formation of a ukulele orchestra, people come together to learn, practice and perform as a group. This Institutional, HEIF-funded, project has demonstrated that making music together has powerful and lasting positive effects on physical and mental health, particularly in terms of combating loneliness and isolation.

**The Wolfson Palliative Care Research Centre is an important part of this research cluster. The recently established centre, part of the Hull York Medical School (HYMS), is one of only 8 partnerships to receive significant funding (>£400k) from Research England, as part of their new international investment initiative (i3funding) in 2019.** The centre has a collaboration with the Centre for Improving Palliation and Chronic Care through Clinical Research and Translation (IMPACCT) group in the University of Technology Sydney, Australia. UK deaths associated with multi-morbidities are expected to increase by 40% by 2040 and new models of care and treatments are urgently needed to improve quality of life for the significantly increased numbers of people living with multiple life-limiting illnesses. **Impact Case Study**, *"Reducing inequalities in palliative care for people with non-malignant disease"*. The twinning of the groups in Hull and Sydney enables cutting-edge interdisciplinary palliative care research. A 5-year exchange programme was established in 2019 and UoH provided funding for 2 PhD studentships from the strategic investment fund. Professor Jane Phillips, Director of Improving Palliative, Aged and Chronic Care through Clinical Research and Translation, University of Technology, Sydney (Australia), said: *"International collaborations like the one being forged as part of the i3funding are critical to building the next generation of international palliative care researchers and to creating teams with the capability of tackling the grand challenge of ensuring everyone with palliative care needs has access to the services and supports they need to live the best life possible."*

**Cancer-Imaging, Diagnostics & Prognostic Tools.** Since the creation of the Postgraduate Medical School in 1993, a strategic collaboration between the UoH and local NHS to develop the medical research environment in Hull and East Riding NHS Trust, we have steadily built outstanding patient recruitment and sample collection procedures. This thematic area has a significant overlap in aims with the **Primary care, Palliative care & Long-term Conditions** cluster, and shares many technologies with the **Centre for Atherothrombosis and Metabolic Disease** cluster.

**1. Cancer Imaging** - the University of Hull is the only UK site to have a research-dedicated cyclotron for preclinical research. This allows us to focus on new tracer development and the delivery of research projects with academic and industrial partners. The University-based Positron Emission Therapy (PET) Research Centre is linked with the Jack Brignall PET-CT centre at Castle Hill Hospital, a tertiary NHS referral centre for Cancer. This centre has significantly increased the screening capabilities for cancer diagnosis with >10,500 patients being seen since opening in 2014; furthermore, new types of scans that enable imaging of heart conditions and infections have been developed improving patient diagnosis. The clinical unit houses a Siemens Biograph mCT Flow Edge PET-CT scanner and will soon house a ground-breaking dose-on-demand cyclotron facility based around a GE GENTrace cyclotron (opens June 2021, delayed from October 2020).

due to COVID-19); **this is the first such unit in the UK and the only one worldwide using a microfluidic device-based dose-on-demand system.** Molecular imaging with PET allows detection of the molecular processes that underpin disease without the need for invasive surgery, meaning that therapy can be personalised to the patients who stand the best chance of responding. The collaborative centres have major MRC, EU, Commercial, NHS and Charity investment offering a cutting-edge research environment for translational healthcare (>£3.8M in REF period). The innovative research has led to the filing of 10 patent applications, covering the development of technology, novel radiotracers and delivery. The Unit has become an internationally recognised specialist training centre with secondments and visits from staff from across the globe, e.g. Southwestern Oklahoma State University (USA) and the Jaber Alahmad Center for Molecular Imaging (Kuwait).

**2. Biological microfluidics** – the University of Hull supported the first tissue-on-a-chip studies reported in 2008 and since then the interdisciplinary group has been at the forefront of the field consistently gaining significant funding (>£3 Million since 2014) from the research councils, Technology Strategy Board / Innovate UK and the EU. Work has focussed on developing dose-on-demand technology for PET-CT and optimising novel microfluidic devices for maintaining human tumour biopsies in a viable state. The biopsies are treated with clinically relevant doses of chemotherapeutic drugs or external beam irradiation, and the effects are measured by detailed analysis of the tissue or effluent; the latter allowing assessment of the temporal effects of the intervention. **A major body of work over the past decade has shown the clinical utility of such devices alongside the benefits in terms of reducing/replacing animal experimentation.** Finally, with the COVID-19 pandemic, there has been much interest in using integrated microfluidic devices for monitoring diagnosis; colleagues in this cluster are already working with Public Health England to develop a novel dual-flow model to assess how the virus crosses the endothelial and epithelial barriers.

**Centre for Atherothrombosis and Metabolic Disease** This group's innovative work tackles several disease areas at the molecular, cellular and patient levels, that are not only major global health challenges but are also significant regional challenges, hence the local patient population is benefitting from being involved in UoH's translational research programmes:

**1. Vascular Biology and Haemostasis** – Over the past 4 years the group has been awarded NIHR-funding for 3 clinical positions (1 clinical lecturer and 2 Academic clinical fellows) helping further to bridge the gap between basic science and clinical application; two internationally-leading research areas are in the management and treatment of intermittent claudication and varicose veins. Both conditions affect large numbers of western populations (5% and 40% respectively), with a significantly higher than average prevalence in the Yorkshire and Humber region. Work from UoH has underpinned National Institute for Clinical Health Excellence guidelines for the UK and informed the European guidelines for both conditions. For Intermittent claudication the team in Hull have shown that a supervised exercise programme is more effective than conservative medical therapy. **Impact Case study**, *“Supervised Exercise Programmes – a non-invasive, clinical and cost-effective intervention for intermittent claudication”*. For varicose leg ulcers the team show that these are best treated with ultrasound-guided endothermal ablation a minimally invasive intervention as compared with surgical ligation which has been used for almost a thousand years. **Impact Case Study**, *“Minimally Invasive treatment for varicose veins in the legs gives patients a significantly improved quality of life”*.

**2. Wound Healing** - Chronic wounds are an expanding problem for patients with multi-morbidities, with major economic and societal implications. Diabetes, frailty and advanced age are the triad causes of wound chronicity; the cost to the NHS is similar to cancer (~£5bn/yr). In collaboration with industrial partners (Smith and Nephew and Reckitt Benckiser), our goal is to develop innovative treatments for these wounds that will bring clinical and economic benefits. Advanced wound care spans the full translational pipeline from discovery science to the clinic. Over the REF period there has been substantial investment (a 6 PhD student cluster; **see Section 3**), HEIF funding, 2 new Lectureships) which has delivered strong outputs and strategic partnerships with industry. The area has received over £2M of Research and Enterprise Income, including competitive funding from the MRC, Innovate UK, National Biofilms Innovation Centre, and British Skin Foundation. Hull has been instrumental in directing Smith & Nephew's new global wound



Research & Innovation strategy, whilst the company have housed state-of-the-art equipment at the University driving world-leading research. Furthermore, a first-in-human clinical trial testing a simple intervention which promotes skin graft healing, identified in Hull's laboratories has been initiated, and a collaboration with Fourth State Medicine re-purposing space satellite propulsion technology for the management of wound biofilm commenced in 2019.

**3. Respiratory Biology** - Respiratory diseases are leading causes of death and disability in the world. About 65 million people suffer from chronic obstructive pulmonary disease (COPD), asthma is the most common chronic disease in childhood, and cough is the most common reason why people seek medical help. Hull's research focuses on the role of thermo-TRPC proteins and purinoceptors in cough and airway inflammation responsible for disease. The group have well established collaborations with major pharmaceutical companies including Proctor & Gamble, Sanofi and GlaxoSmithKline; >£1M funding in the REF period. Novel mechanisms underlying chronic cough have been discovered in Hull, and these findings have resulted in both national and international guidelines being revised as well as the development of a new class of drug; antagonists of the P2X3 purinergic receptor. The first Phase 3 trial undertaken by Merck has reported extremely encouraging results with approximately two thirds of patients with chronic cough responding. The work is described as an **Impact Case Study**, "*Chronic cough: defining a "new" disease and producing a novel class of effective drug*".

### Seminar programmes

To support postgraduate learning the FHS runs two broad seminar programmes (Biomedical science and ICAHR) that provide students and academics with fora to discuss recent advances in healthcare. **Students are actively encouraged to contribute and develop their critical thinking in a challenging, but supportive, environment.**

Each seminar series, held weekly during semester, combines a forum for visiting speakers with the opportunity for our postgraduates to present their work. Whenever an external speaker attends there are facilitated sessions for the postgraduates to discuss their research and receive valuable, external, insight following the session. During the COVID-19 lockdown these have continued online through Canvas; presentations have been equally well received and detailed discussions took place using the question/answer forum. These interdisciplinary seminars are held every second week in addition to regular masterclasses on research methodology, and subject specialist areas such as Frailty, Multiple Comorbidities, Alcohol/substance use. Between June and November 2019, 18 seminars and masterclasses were held.

Since 2011 the annual, endowed, Allam lecture series has been held. Prestigious speakers from across the breadth of medicine relevant to Hull's research programmes have been invited to an event that attracts an average of 225 attendees (students, academics, healthcare professionals and general public). In addition to the plenary lecture there is an extensive series of posters and invited oral presentations, **making this a vibrant celebration of science and opportunity to disseminate Hull's research widely.**

### Speakers include:

- 2014 – Sir Magdi Yacoub, 'The glory and threat of science and medicine'
- 2015 – Professor David Leaper, 'Where I will heal me of my grievous wound'
- 2016 – Professor Maria Belvisi, 'How the lung senses its environment'
- 2017 – Professor S Richard Underwood, 'Cardiac imaging: the next decade'
- 2018 – Professor Stephen Shalet, 'Cancer survivors: the new endocrine epidemic'
- 2019 – Professor Keir Lewis, 'Smoking cessation and tobacco control throughout the ages'
- 2020 – Professor I Sadaf Farooqi, 'Eating too much or too little?' – *postponed due to COVID-19*

### Research & Impact Strategy

Each research cluster produces a 3-year research strategy document, reviewed annually at Faculty Research Committee (Chaired by the Associate Dean for Research). These include a SWOT analysis that includes equality and diversity and ECRs development. All new research staff

are required to complete an online Research Integrity course, that covers all aspects of good practice, this must be redone on a 3-yearly basis.

Following the successful UoA3 Allied Health Professions, Dentistry, Nursing and Pharmacy submission in RAE2014 and UoA12 submissions in 2014 and 2008 respectively, UoH has continued investing in major health issues facing society: mental health, cancer, chronic cough, heart disease, obesity and multimorbidities; supporting multidisciplinary, translational, research with the aim of continuing to make novel discoveries and deliver patient benefits. As described above, the recent major reorganisation of the University was undertaken to strengthen the focus and multidisciplinary of its cutting-edge research themes, as well as supporting new Institutional-wide innovations, e.g. Project Aura, a catalyst for collaboration that brings together industry partners to harness and drive innovation in the offshore wind sector. Project Aura includes the EPSRC funded Aura Centre for Doctoral Training (CDT) in Offshore Wind Energy and the Environment which is based at UoH, with Durham, Newcastle and Sheffield universities as partner Institutions. **Project Aura has an important healthcare theme in relation to understanding the stresses that wind farm workers' suffer and offering early identification and improved training.**

Researchers at UoH, in collaboration with academics around the world and partnerships with patients, user groups and commercial entities have continued to work closely with clinicians from the local NHS Trusts in developing successful research programmes leading to improvements in knowledge and patient care to address many of the major health issues, e.g. mental health, cancer, obesity and multimorbidities.

Interdisciplinarity is fundamental to healthcare research at UoH, with all the research themes comprising staff from distinct specialities; the institution has been pursuing this research strategy since the creation of the Postgraduate Medical School in 1993. The culture was significantly boosted with the establishment of HYMS in 2003 along with the growth in nursing and physiotherapy research over the past decade and has culminated in the consolidation of all health-related activities into a single Health Sciences Faculty. Since 2017 healthcare research has flourished under the consistent and streamlined policies and processes.

UoH is committed to promoting equality of opportunity for all, giving every individual the chance to achieve their potential, free from prejudice and discrimination. The University's Equality Scheme was published in 2017, and in the same year the University committed to 'Disability Confident'. There is an active LGBT Staff Network within FHS, which advises the Faculty leadership team. It remains UoH's aim to use its staff's diverse backgrounds to enhance professional knowledge, bring challenge and new perspectives to all that is done on campus. The goal continues to be to build capability and support for all our students and staff. UoH is an organisation that wholeheartedly embraces equality, diversity and inclusion believing this will deliver better results, greater innovation and impact, more motivated staff, and increased recognition from our partner organisations. FHS is fully committed to:

- *Treating all staff and students fairly;*
- *Actively creating an inclusive culture for all staff and students;*
- *Ensuring equal access to opportunities to enable students to fully participate in the learning process;*
- *Enabling all staff and students to develop to their full potential;*
- *Equipping staff and students with the skills to challenge inequality and discrimination in their work and study environment;*
- *Making certain that all learning materials and other resources do not discriminate against any individuals or groups.*

In addition to the above ethos, supported by relevant codes of practices and statutes, the FHS has a network of Dignity and Respect Advisors (DARAs). These are staff from across the faculty, who work to support our commitment to equality of opportunity. DARAs are approachable, independent, fully trained and ready to help any staff and visitors who may be experiencing problems with harassment and bullying if it does occur.

**Strategic Aims and Goals 2021-2028**

Having more than achieved the research goals set in 2013, e.g. establishment of the Institute for Clinical and Applied Health Research hub (ICaHR); the roll-out of improved cancer imaging services (further strengthened during the REF period by substantial investment in the Molecular Imaging unit); and classification of breathlessness and chronic cough as diseases; and in both cases novel treatments have been developed. The aims are to continue to produce the highest quality research that is effectively translated into widespread practice, and to train the research leaders of the future. Specifically, during the next REF period the following institutional and healthcare specific aims will be addressed:

- There will be a continued focus on areas of strength within the research themes, i.e. cancer, long term conditions, mental health. Specific project will be focused on tackling breathlessness, developing novel technologies to deliver bespoke PET-CT agents, and improving uptake of the innovative treatment approaches discovered by UoH teams. The strategic establishment of new PhD research clusters, continuing to have multi-disciplinarity at their core, will provide the impetus for the next breakthroughs. Also, the aim is to increase external grant funding through increased collaborative projects with commercial partners, end-users and NHS colleagues; new Faculty, **Director of Business Engagement & Enterprise posts have been created to facilitate this.**
- FHS is committed to providing an inclusive and diverse environment, in line with the broader University strategy and intends that all areas are at least Athena Swan Silver by 2026; to facilitate this Faculty champions have been appointed and given time in their workplans and resource to drive these submissions. Secondly, FHS has an aim to remove the attainment gap for all students so that there is equity in completion and awards. Finally, the mentorship of ECRs will be prioritised with Faculties needing to identify support and have monitoring structures in place to develop staff to their full potential, promoting Equality, Diversity and Inclusion.
- Specifically, there are well-developed plans to use Viper, Hull's high-performance computing cluster (see **Section 3 Income, infrastructure and facilities**) for bioinformatic analysis of large RNAseq, metabolomic and proteomic datasets arising from the successful Health & Global Data Pipeline PhD research cluster, e.g. pancreatic tumour response to chemotherapy (Prof Maraveyas and Greenman) and diabetic patients treated with exenatide. In addition, in collaboration with colleagues in Leeds School of Medicine, projects have been commenced to study the responses of glioblastoma to treatment using single cell RNAseq. The aim in every case is to provide new markers of prognosis and the ability to truly personalise treatment through the exploitation of Big Data.

**2. People**

The Faculty of Health Sciences research strategy underpins investment in new appointments and facilities, with the explicit aim that staff are empowered to produce outputs of the highest quality. All new appointments are placed in existing research teams, or where a new strategic area is created this will be led by a Chair appropriately supported by senior positions and junior academics. **All early career staff members (ECRs) in whichever academic discipline are extensively supported.** Measures include the allocation of both research and teaching mentors, and support in joining PhD clusters to provide studentships, together with start-up funds to pump-prime research. Furthermore, all research-active ECRs have a light teaching and administration load (<20%) for the first three years of their tenure during which it is expected they submit to the most relevant new investigator grant-funding scheme in the second year of appointment, allowing refinement and resubmission in year 3 if unsuccessful. The Research Funding Office particularly supports these staff in applying to other sources of start-up funding. Plans for study leave of varying lengths (up to a semester every 3 years) are encouraged from all members of staff to ensure staff develop/remain abreast of advances in their field through collaborative networks of peers, industry and colleagues in practice. Longer periods of time can also be requested if necessary and following Faculty evaluation may be granted by the Pro-Vice Chancellor (Research & Enterprise).

During the 2018/2019 academic year the University initiated a Transformation programme, a key component of this was a new academic careers' framework where all staff were aligned to one of 4 strands that best reflected their job role: Research, Teaching, Entrepreneur, or Transitional. All

staff on the Research domain have at least 40% time for research in their workload, and all are returned under the relevant REF Unit of Assessment. The allocation to the most appropriate strand was done in consultation with the line manager and allows all staff the opportunity to reflect on their current role and future career plans. The Transitional strand is used mainly for ECRs who have not yet established their independent research career, or where someone has held significant management responsibilities but is moving back to one of the other three categories. Staff on this strand will be reviewed after 2 years to assess progress and provide additional mentoring or support as required.

The University is fully committed to the principles of Athena SWAN and a steering committee, chaired by the Pro-Vice Chancellor (Research & Enterprise), oversees this and all staff development activities. UoH has a Bronze Athena Swan award and HYMS, in partnership with the University of York, has a Silver award. The School of Health & Social Work, now part of the Faculty, has also achieved the Bronze award. **Plans are in place for the entire Faculty of Health, with the exception of HYMS, to submit an Athena Swan Bronze application in April 2022, with the aim of the Silver award by 2026.** In a similar manner that Athena Swan seeks to advance gender equality across all aspects of academia, the University recognises the need to value and enhance the career development of post-doctoral research scientists. A steering group, comprising representatives from all faculties, oversees the adoption of the Concordat supporting the Career Development of Researchers; importantly this group has representation from the post-doctoral researcher community in FHS. To promote **Equality, Diversity and Inclusion, FHS established a team of EDI champions, who work to ensure that diversity is promoted throughout all curricula, including postgraduate research modules offered by the University's Doctoral College (see below).**

The UoH Staff Development Unit provides a series of comprehensive training packages for all new staff, commencing with an induction course and training in research supervision, plus the compulsory Higher Education Teaching Certificate for all staff without the necessary teaching experience. Furthermore, UoH encourages all staff, however senior, to gain an appropriate teaching qualification to enhance the student experience. The Staff Development Unit produce and commission an extensive range of on-line courses to complement the practical training delivered in person. Each member of staff has an on-line training account that shows which courses have been undertaken and when refresher training is required; many of these courses are specifically for the post-doctoral community. Staff development is actively monitored by Heads of Department as part of the annual appraisal/workload discussion; from these discussions comes an individual set of goals for each member of staff.

Since 2014 UoH has continued to invest in a series of PhD studentships in healthcare. Numbers of completed studentship were increasing at the end of the last REF period (28 in 2013 and 32 in 2014) and have remained at an average of 30/year through the current REF period. **This reflects a significant increase from REF2014 (where there were 117 successfully completed postgraduate degrees), to 210 students in the last 7 years.** In a strategic move to concentrate research and build critical mass in areas that align with the Institution's strengths and its important local and regional roles UoH changed the way it supports PhD studentships. Thus, since 2016, the Doctoral College has operated a scheme whereby academic teams draft bids that combine a series of inter-related PhD projects drawing on complementary expertise from across UoH. These applications can also include external input and funding from other academic institutions and/or the business sector. An internal competition is held, facilitated by external expert panel members, to select the best projects and culminates in the award of 5 to 8 PhD clusters (3-6, fully funded studentships and/or fee waivers) each year. Details of PhD clusters awarded to staff in UoA3 are given in **Section 3. Income, infrastructure and facilities** (Table 1). Supervisory teams are required to be multidisciplinary and ideally cross-faculty in nature, to promote interdisciplinarity. Other key facets of all the projects, in addition to the fit with the strategic themes of the Institution, are sustainability and ease of appropriate translation, i.e. device development, incorporation into policy or healthcare improvement. Students become embedded in the relevant research groups contributing to the PhD cluster, and the cluster itself forms the nucleus of the multidisciplinary activity fostering new research ideas and funding, whilst benefiting from the existing research ethos in the various groups.



The University's Doctoral College is both the administrative centre for postgraduate research students and a purpose-built resource, with its own 24-hour access IT facilities and common rooms. It oversees the monitoring of all research student progress. Monthly supervisory meetings held between all full-time postgraduate students and their supervisors (these are held at appropriate times for part-time students, e.g. 2 monthly if the student is studying 50% of the time). If progress issues are raised by supervisors or students the relevant departmental Postgraduate Research Director will attempt to resolve in the first instance, if additional action or support is needed this will be done in discussion with the Doctoral college and the Faculty Associate Dean for Research as necessary. All postgraduate (MSc, MD, PhD) students produce annual reports at the end of year 1 and year 2, and academics independent of the supervisory team hold an oral examination providing the students with an opportunity to discuss and refine their work. **Throughout the COVID-19 period the research training framework has continued to be provided online. Additional measures have been put in place to support PGR students including regular communication, financially supported extensions where appropriate, regular assessment of COVID-19 impact on research projects and mitigation plans, and increased pastoral support.**

Giving postgraduates chances to network and present their data is considered an essential part of their training. HYMS runs an annual postgraduate conference bringing students and academics from Hull and York together for a series of poster and oral presentations, which also provide the students with the experience of organising the event and chairing sessions. This event is open to all students within the healthcare field. Another opportunity, since 2014, is through attendance at the International Medical Postgraduate Conference in Hradec Kralove (Czech Republic); the event hosts between 30 and 40 postgraduates from across Europe. Hull has been able to enter two current PhD or MD students for this annual conference. The University runs an internal competition to select the best students to represent the University at this event and we have been highly successful, winning in 2014, 2015 and 2020, and second in 2019. Students who have attended have valued the opportunity to network with contemporaries across Europe, bridging disease states and methodologies; *"The experience was unlike any other conference, there was such a diversity of topics and a willingness to discuss science; I was amazed to see how postgrads undertake their projects in completely different research environments."* (HM; Hull winner in 2015).

### 3. Income, infrastructure and facilities

UoH receives approximately £7.5million in QR of which approximately £3.3million is allocated to the FHS. **The Institution has taken the strategic decision to invest almost half its QR funding to support PhD/PDRA clusters to build capacity in priority areas, with the remaining funds to be used by Faculties to support new positions and infrastructure.** The University has also invested in a significant refurbishment and redesign of the library (£27 million). In addition to dedicated PhD workspace, there is increased access to fully networked computers and extensive journal collections, the majority of these being available online. In 2019 alone, UoH spent £1.75 million on annual journal subscriptions and full text databases, which has been especially beneficial during COVID-19 due to increased remote working. The library is host to a highly regarded art collection and regularly hosts cultural events, to which all PGR students have access. UoH is home to Viper, a high-performance computing (HPC) cluster, which came online to users as a service in June 2016. It is the highest rated HPC in the North of England and is available to all Faculties.

UoH plays a role as an anchor institution in the region and thus any Faculty investments must align with this function. For FHS, there are close collaborations with the local NHS and pharmaceutical industries and the broad aim is to improve and apply knowledge in a way that improves patient care for national diseases which disproportionately affect the local population, e.g. mental health, diabetes, cancer, heart disease, and obesity. An important consideration for investment is generating or sustaining critical mass, and the leveraging of additional research funding.

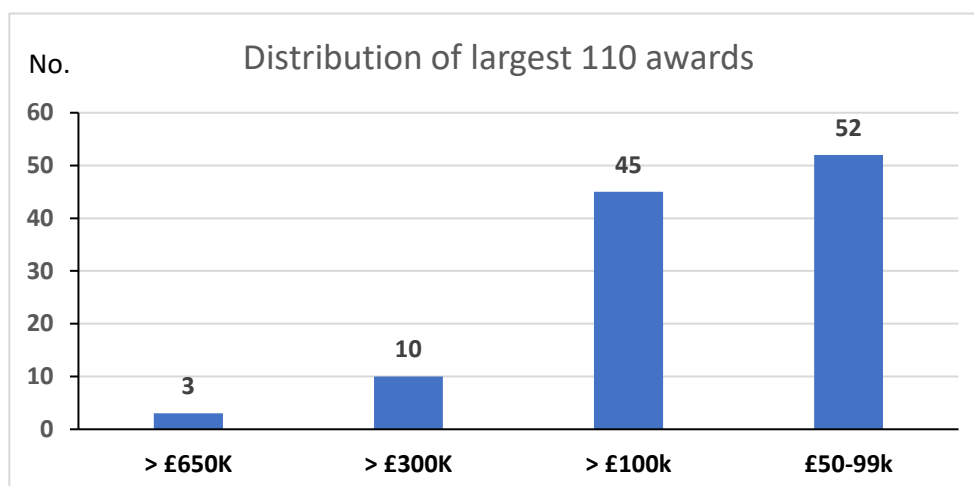
**ICAHR was established to fulfil ambitious plans for research growth in clinical and applied health research at UoH. It was designed to provide significant strategic investment in areas of research strength and underpin that expertise with a health trials unit and methods infrastructure.** The overwhelming motivation behind this initiative was to make a difference to the health of the local population and to establish UoH as a centre of excellence in clinical and applied health research. The vision was that this would enhance research already taking place in Hull and

would be a helpful way of promoting our research; it was not intended to replace existing structures but to become an interactive hub. ICAHR was established through direct UoH investment and the award of a peer-reviewed programme grant from Yorkshire Cancer Research (currently £4.9m, but available funds of £5.2m), following the return of an endowment held by UoH. In line with its research strategy FHS has established three core research teams each focusing on a substantive area of research and have invested in clinical (not necessarily medical) academic staff to bolster existing areas of strength. The two themes are primary care, palliative care (**Primary Care, Palliative Care & Long-term Conditions cluster**) and peri-natal health (**Maternal, Reproductive & Sexual Health cluster**) and all build on existing research strengths at Hull. The cluster model enables us to build additional teams with future investment, for example from the medical school expansion budget; i.e. in 2017 HYMS was the most successful of the existing UK medical schools in the application for new undergraduate student places.

The current UoA3 submission is returning 60.17 FTE staff, 66% greater than REF2014 (n=36 FTE). This is due to increased investment in all the departments comprising UoA3. There has been a concomitant increase in grant income and number of postgraduate student completion /annum/ academic demonstrating the vibrant research ethos. As is shown in REF4a there is an average research spend of £3.5 million/annum from a total of 550 awards over the 7-year REF period. The top awards, by spend, are shown in Figure 2. Breaking this down in terms of different funders across the whole REF period shows that UoH research has a relatively broad funding base with the major sources being:

- **Research Charities**, including Yorkshire Cancer Research, Cancer Research UK and British Heart Foundation £8.6M
- **Commercial funding** £3.7M
- **NHS sources** £4.7M
- **UK Research Councils & Health Research Funding Bodies** £4.3M
- **European Union** £2.1M
- **Other funding** £0.8M

**Figure 2.** Grant spend distribution according to value



The following exemplify the breadth and nature of awards:

- 2019-2021 **NIHR RfPB £149k**. High Intensity Interval Training In pATiEnts with intermittent claudication (INITIATE) study. **Chetter I (CI)**;
- 2018-2020 **MRC £135k**. Confidence in Concept 2018 - University of Hull;
- 2018-2022 **NIHR HTA £1.2M**. A parallel group, double-blind, randomised, placebo-controlled trial comparing the effectiveness and cost-consequence and cost effectiveness of low dose oral modified release morphine (MRM) versus placebo on the intensity of worst breathlessness in people with chronic breathlessness. **Johnson MJ (CI)**, **Currow DC**, **Hart SP**, Pearson M, Seymour J;

- 2017–2019 NIHR RfPB £235k. A feasibility, randomised controlled trial of a complex breathlessness intervention in idiopathic pulmonary fibrosis. **Crooks M (CI), Hart S, Johnson MJ**, Swan F, **Dyson J**;
- 2016–2023 **Yorkshire Cancer Research £4.9M**. Reducing Inequalities in Cancer Outcomes in Yorkshire: Realising our potential for innovation in Patient Management, Survivorship and Palliative Care Research. **Macleod U & Johnson MJ (Co-Is), Lind M, Mitchell ED, Murtagh F, Currow DC**;
- 2016-2019 **Burdett Trust for Nursing £184k**. Supporting Transition and Retention of newly registered nurses. **Watson R, Wray J**, Barrett D
- 2016-2019 **Innovate UK/EPSRC £496k** Development of a multi-purpose small animal phantom for pre-clinical radiotherapy studies. **Greenman, J (CI)**, Green, VL, Cawthorne, C;
- 2013-2019 **European Union FP7 £580k** Clarke, J. HOMAGE – Heat “omics” in Ageing;
- 2011-2018 **NIHR i4i £668k**. Elliott, B Wadhawan, J., Singh, R., MacFie, J **Greenman, J**. Development of a placement sensing nasogastric tube;
- 2007–2017 **NIHR Programme Grant £ 2.1M**. *Challenge Demcare* Challenging Behaviour in Dementia at home and in Care Homes. **Moniz-Cook E (CI)**, *et al*.

Postgraduate student completions total 210.4 over the REF period, an average of 30/year, this is a 30% increase on REF2014 where the average was 23 PGR/year and is in line with the increased number of staff submitted in the current submission.

	2013	2014	2015	2016	2017	2018	2019	TOTAL
<b>COMPLETED</b>	28	32	27	34.5	37	24.5	27.4	<b>210.4</b>
<b>POSTGRADUATES</b>								

The strategic importance of the PhD clusters is reflected in the continued financial and academic investment planned for PhD clusters in the next REF period. Sustainability is a key factor in all PhD cluster cases and credible strategies for the next 5 years are a key part of the selection criteria, along with strategic focus and align with UoH priorities. Furthermore, there is an agreed strategy (see **Section 1 Strategic Aims and Goals 2021-2028**) to focus on PhDs jointly funded with industry to enhance the translational aspect of UoH's healthcare programme with strong support for Knowledge Transfer Partnerships having recently been put in place to build on REF2021.

### Faculty Research Support Fund

With the formation of the new Faculty in August 2017, a strategic decision was made to consolidate the Departmental Research funds at Faculty level and operate a system whereby 2 or 3 calls/year are made for applications; with a total budget of up to £100k. The committee is chaired by the Faculty Associate Director for Research and attended by Heads of Department and Research leads. The aim of the funding is to pump-prime new initiatives in strategic areas, or build capacity, by allowing research visits, conference attendance, purchase of small items of equipment, publication charges, etc. Postgraduate students, postdoctoral researchers and ECR are explicitly encouraged to apply for support and approximately half of the funding is awarded to these applications. Two examples of this funding use are given. A grant of £2,725 was made to Dr Mark Wade, an ECR, to complete work on some novel therapeutic agents in breast cancer in Jan 2019. This resulted in a last author publication for Dr Wade (Jones et al; *Cancers* 2019, 11(8), 112) that is included in this UoA3 submission, and pump-primed his Academy of Medical Sciences Springboard application in 2020. Secondly, a grant of £3,500 was given to Dr Victoria Green, a senior PDRA, in Sept 2018 to undertake preliminary work on exosome isolation from thyroid tissue and cell culture supernatants. **Following a successful pilot study she was awarded £15,000 grant-funding from the Get A-Head Charitable Trust** (Project entitled “Evaluating EV as a therapeutic target in Graves’ disease” 01/02/2019 – 30/04/2020) to fund a studentship and consumables. This was the first time funding has been achieved from this Trust.

**Table 1. PhD cluster awards to UoA3 for Healthcare research**

Year				
2016	<b>Cardiovascular &amp; Metabolic Disorder</b> Clinical cardiovascular, respiratory and metabolic medicine <b>3PhD</b>	<b>Cardiovascular &amp; Metabolic Disorder</b> New paradigms in blood platelet biology - understanding the role of platelets in thrombo-inflammation <b>4PhD and 1 PDRA</b>		
2017	<b>Cardiovascular &amp; Metabolic Disorder</b> Cardiovascular Health; maximising the key physiological and biochemical effects of exercise and other novel interventions in atherosclerosis. <b>4PhD and 1 PDRA</b>	<b>Cardiovascular &amp; Metabolic Disorder</b> Advanced Wound Care cluster; from novel therapies to clinical trials. <b>6 PhD</b>	<b>Maternal, Reproductive &amp; Sexual Health</b> Maternal & Reproductive Health. <b>3PhD and 1 PDRA</b>	<b>Primary care, Palliative care &amp; Long term conditions</b> Improving symptoms, outcomes and access to care for those with advanced progressive long term conditions, multimorbidity and frailty in primary care. <b>4PhD and 1 PDRA</b>
2018	<b>Cardiovascular &amp; Metabolic Disorder</b> Optimising outcomes in diabetic patients with peripheral arterial disease <b>3PhD</b>	<b>Cancer – Imaging, Diagnostic &amp; Prognostic tools</b> Detection and Characterisation of Biomarkers for the Earlier Detection of Chronic Disease <b>5PhD</b>	<b>Cancer – Imaging, Diagnostic &amp; Prognostic tools</b> PET Healthcare technologies <b>4PhD</b>	<b>Cancer – Imaging, Diagnostic &amp; Prognostic tools</b> Health*GDP - Health Global Data Pipeline for biomedical research and clinical applications <b>3PhD</b>
2019	<b>Primary care, Palliative care &amp; Long term conditions</b> Bridging the Divide: Living With Multimorbidities <b>3PhD</b>	<b>Cancer – Imaging, Diagnostic &amp; Prognostic tools</b> Adaptive Radiotherapy: Engineering the radiobiological tumour for improved radiation success <b>5PhD</b>		
2020	<b>Cardiovascular &amp; Metabolic Disorder</b> The Clinical Application of Next Generation Microbiome Profiling Cluster <b>4PhD</b>			

In addition to the PhD clusters above, awarded to specific research areas, two further clusters were awarded to staff returned in UoA3 due to strategic important and UoH priorities:

2016 Dr Judith Dyson and Dr Fiona Cowdell (FHS) led a cluster entitled, PoWER 360: Programme for Women Achieving Excellence in Research – 3 PhD studentships and 1 Postdoctoral Research Assistant.

2020 Prof Joanne Reeve (HYMS) leads a cluster entitled, Homeless Healthcare in Hull - 3 PhD studentships



#### 4. Collaboration and contribution to the research base, economy and society

As exemplified in Figure 1, most healthcare research in Hull has marked external impact both in terms of collaborations and the outputs themselves. The following section will take each sector in turn and the impact that Hull makes is described.

##### Summary of contribution to Journals and grant review

The staff submitted in UoA3 contribute significantly to a large number of **editorial boards** (65 in total); an average of 1 board/academic. These include for example: Prof Mark Hayter - Editor of *Journal of Advanced Nursing* (2016-); Dr F Rivero-Crespo - Section Editor-in-Chief of *Cells* (2020-); Prof R Watson - Editor-in-chief of *Journal of Advanced Nursing* (2012-2021) and *Nursing Open* (2014-2021). Furthermore, staff are heavily involved serving on **grant panels**, current examples include: Prof Mat Hardman (Agence Nationale de la Recherche, Physiopathologie Panel Member, 2017-); Prof Miriam Johnson (Vice-Chair of the Marie Curie Research Funding Grant Committee, 2019-); Prof Fliss Murtagh NIHR (Programme Grants for Applied Research panel as a general methodologist, 2017-); Prof Tim Palmer (BHF Career Re-entry Research Fellowship panel member (2017-), and Dr Chao Huang NIHR (Research for Patient Benefit Yorkshire and North East Regional Advisory Panel, 2019-). As expected, staff have **reviewed numerous grants from all the UK health-related Research Councils and major charities** (MRC, NIHR, BBSRC, BHF, HR-UK, CR-UK, Wellcome, UKRI-FLP) and many overseas agencies including the EU, NHMRC (Australia), Health Research Board of Ireland, Swiss National Science Foundation, Italian Medical Society, and Hong Kong University Grants Council.

##### Selection of National & International awards:

- Prof E Moniz-Cook – NHS England Leadership Academy: NHS Quality Champion/Innovator of the Year (2014)
- Dr L Sadofsky - Bionorica Global Research Initiative Prize (Eur50,0000) (2014)
- Prof D Currow – Winner, Tom Reeve National Award for Outstanding Contribution to Cancer Care - Clinical Oncological Society of Australia (2015)
- The UoH Lab on a Chip research, led by Prof J Greenman, won the “Best Emerging Technology” at the inaugural Hull and East Yorkshire Digital Awards (2015)
- Prof F Murtagh – NHS London Leadership Awards, ‘NHS Outstanding Collaborative Leader of the Year’ for the London region (2015)
- Prof R Watson - International Nurse Researcher Hall of Fame (2017)
- Dr E Wolverson – Alzheimer’s Society’s Dementia Researchers’ Leaders Award (2018)
- Prof I Chetter – NIHR Senior Investigator Award (2018-2023)
- Prof R Watson - Member of Academia Europea (2019)
- Prof M Hayter - Honorary Fellow, University of Genoa Honour Nursing Society (2019)
- Dr R Masamha – Young Researcher Prize, Britain Zimbabwe Society Prize (2019)
- Dr J Wray – Fellowship (Nursing & Midwifery) Royal College of Surgeons in Ireland
- Ms N Clark - Nicky Clark received the Chief Midwifery Officer Gold Award (2020)
- Prof F Murtagh – NIHR Senior Investigator Award (2020-2025)

##### Research base

- Yorkshire Cancer Research (YCR) awarded a **£4.9M programme grant in 2017 to a bid led by Prof Una Macleod (Dean, Hull York Medical School) at UoH to deliver a series of research projects that will improve the experience of cancer patients and ensure more people in the city survive the disease.** The death rate of cancer is higher in Yorkshire than the rest of England resulting in about 200 extra deaths each year, of which more than half are in Hull. Other significant cancer outcome inequalities between different groups exist; for example, poorer people and older people are more likely to die sooner. We will conduct research to understand these differences and develop and test ways to reduce the inequalities and improve access to care and best treatments. The investment funds 11 research positions in ICAHR. the *Primary care, Palliative care & Long-term*

*Conditions* research cluster and the *Cancer – Imaging, Diagnostic & Prognostic tools* research cluster; the long-term aim is to establish Hull as a centre of excellence for cancer research. In 2018, a further £1.4m investment from YCR funded the development and testing of a new guide to help GPs and practice nurses identify and manage the needs and concerns of people with cancer and their carers. The four-year trial, led by Prof Miriam Johnson, Professor of Palliative Medicine at HYMS, is aiming to recruit more than 1,000 patients living mainly in the Yorkshire and Humber region.

- The Daisy Appeal, a local charity that has raised >£20 million since its establishment in 2000, has significantly improved research and treatment facilities for people in the Hull & East Yorkshire region. It has provided modern, well-equipped, scientific laboratory facilities, a clinical trials unit, and teaching accommodation; an ideal environment for several Hull researchers to base their research groups since July 2008 (Profs Mat Hardman and John Greenman, Drs Angela Oates and Lynn Cawkwell). In 2004 the Jack Brignall PET-CT Scanning Centre was opened to complement the research laboratories; both facilities are on the Castle Hill Hospital site, a tertiary referral centre with the regions cancer and heart disease units. The final component of the state-of-the-art imaging infrastructure is the opening of a Positron Emission Tomography research Centre (PETRC) in June 2021 (delayed due to COVID-19 from Oct 2020), comprising radiochemistry and cyclotron units capable of producing extremely short-lived (half-lives in minutes) radioactive tracers led by Prof Steve Archibald (clinical advisors include Dr Hoyer, Profs Michael Lind, Alyn Morice & Anthony Maraveyas). This £8.2M facility offers a unique research base in the North-East and allows innovative tracer research to benefit patients with malignancies, heart and neurological conditions (including Alzheimer's disease).
- In a similar manner to the Daisy Charity, through a generous philanthropic gift of £8 million from Dr Assam Allam (an alumnus of the university and highly successful local businessman) a new Diabetes Centre is being built based on local clinical need but underpinned by a cutting-edge research programme led by Prof Thozhukat Sathyapalan. His main area of interest is on modulation of cardiovascular risk through pharmacological and nutritional interventions in diabetes, obesity, and metabolism. Prof Sathyapalan is leading the national real-world study on flash glucose monitoring system funded by the Association of British Clinical Diabetologists for type 1 diabetes (ongoing) which showed substantial benefits in improving diabetes control, reduction of health care resources uses and improvement in quality of life (<https://doi.org/10.1111/dme.13882> DUK 2019; <https://doi.org/10.2337/db19-299-OR> American diabetes association, 2019). **As a result of positive outcomes demonstrated in the preliminary analysis of this ongoing study, since April 2019 the use of flash glucose monitoring is becoming routine clinical care nationally with some areas already prescribing to >40% of their type 1 diabetes population** (<https://www.england.nhs.uk/wp-content/uploads/2019/10/improving-tech-treatment-care-people-with-type-1-diabetes-letter.pdf>). This innovation is sustainable in the long term as a result of the cost savings, and has made a significant benefit to the UK population.
- Prof Smith has led a Schools' Health Project in North Nigeria for the past 2 years. Research on health literacy and health behaviours of adolescents in 4 secondary schools in Jigawa and Kano states, North Nigeria, has contributed substantially to our understanding of the determinants of health and the health needs of adolescents in this region, which are applicable to other countries in Sub-Saharan Africa. **The research addresses sustainable development goals 3 (Good health and wellbeing) and 5 (Gender equality)** with specific targets within the goals relating to reducing maternal and infant mortality, increasing delivery of sexual and reproductive health education, and improving access to sexual and reproductive health services, and gender equality. The expected impact will be an increase in planned pregnancies leading to a reduction in maternal and infant morbidity and mortality.

There has already been impact through raised awareness and engagement of key stakeholders in the region including adolescents, teachers and school principals, and partnership with an Oxford-based International Development Organisation (INASP) on

research writing capacity building work with Early Career Researchers at Bayero University, Kano. Several policy engagement workshops have been held with key stakeholders including international and regional NGOs, parliamentarians, representatives from state ministries (Health and Education), religious leaders, and community organisations.

- Dr Dan Hampshire is on the steering group that oversees the Coagulation Factor Variant Databases established by the European Association for Haemophilia and Allied Disorders. The combined database portal provides searchable lists of DNA sequence variants and information on the phenotype-genotype correlations in patients with inherited clinical bleeding disorders. The current portal (<http://dbs.eahad.org/>) includes databases for von Willebrand factor (VWF) and coagulation factors IX, VIII and VII and there is on-going work to incorporate further genes. **This portal provides a worldwide repository of accurate and consistent information about coagulation factors, relevant to those working in the clinical and scientific sectors.**
- As part of UoH's work in long-term conditions, Dr Andrea Hilton, was a co-applicant on a project which focused on the feasibility of a medication review and person-centred care for people living with dementia in a care home, involving a pharmacy-health psychology dual intervention. Antipsychotics are often prescribed for people who have behaviours that challenge but, every year antipsychotics are implicated in 1800 deaths and it is suggested that two-thirds of this drug use is inappropriate. Several key messages came from this work including, for clinicians, that inappropriate medication is broader than antipsychotics, i.e. antidepressants, and that specialist pharmacists can support primary care medicine optimisation. Work on multimorbidity and dementia is continuing due to a UoH PhD cluster, exploring what multimorbidity looks like in dementia, and how people with dementia and their carers live day to day with these conditions.
- Hull University researchers (Richfield and Prof Miriam Johnson) have developed and validated the Needs Assessment Tool-Parkinson's disease (<https://hydra.hull.ac.uk/resources/hull:13757>), which was used by a research team in Denver, USA as the basis to identify their clinical study population **in a landmark trial showing effectiveness of palliative care for people with Parkinson's disease for the first time world-wide.** ([https://jamanetwork.com/journals/jamaneurology/full\\_article/2760511](https://jamanetwork.com/journals/jamaneurology/full_article/2760511))

### Economy

- Hull successfully bid for The STaR project (Successful Transition and Retention) funded over three years by the Burdett Trust for Nursing (£183,857) run by Dr Jane Wray and Prof Roger Watson. Conducted in collaboration with education providers and the NHS and private healthcare employers this is contributing to a better understanding of qualified nurse turnover within the first 12-months after registration. This research has led to our involvement as one of the UK partners in the recently launched pan-European Centre of Excellence for Research into Continuing Professional Development (Faculty of Nursing and Midwifery, Royal College of Surgeons Ireland). The work has produced a retention toolkit which is being made widely available to NQNs and healthcare providers who employ and/or support newly qualified nurses. **Nationally, NHS Employers and NHS England and NHS Improvement will support the toolkit by hosting this on their website from October 2020 as an example of best practice in retention.**
- In June 2017 a Strategic Research Framework was signed with Smith & Nephew (S&N) in the area of "Advanced Wound Care". S&N's Global Wound Care Headquarters are based in Hull, where over 30% of their employees are alumni of UoH. S&N have invested in research infrastructure on the University campus, e.g. the second ever Liveocyte imaging suite in the UK, and benefited from University technology capabilities, such as 3D printing and augmented reality. The collaboration spans the S&N business portfolio, from mechanistic and mode of action studies, through model development, to safety and efficacy testing. We are: developing wound technologies of the future, e.g. 50/50 MRC CiC and S&N funded wound sensor project; revealing important new insight into the mode of action of existing advanced wound care technologies, e.g. Negative Pressure Wound

Therapy; and delivering innovative investigator led clinical trials, e.g. hair cycle manipulation to promote healing. **To date we have undertaken over 25 collaborative research projects, bringing >£1M of research investment to the University.** This partnership has formed one of the largest multi-disciplinary PhD student clusters of "Wound Care" research in Europe - to date a total of 9 PhD students have been supported: five funded by the University, three by S&N and one externally.

- Hull is the home of Reckitt Benckiser's (RB) global research centre, and following extensive discussions, in 2019 the University launched a Pharmacology and Drug Development MSc. The course director, Dr Simon Calaminus, liaised with colleagues at RB, including the Chief Medical Officer, who now contribute to teaching the students on drug development and formulation within the pharmaceutical industry. Furthermore, the company supplied an industrial tutor for each student to act as a mentor alongside the academic input. There are plans for development of additional modules, which will give the students the technical laboratory skills required within the pharmaceutical industry.
- Work led by Prof Una Macleod and Dr Liz Mitchell has improved GP practice on early diagnosis of malignancy through the development and implementation of a Significant Event Audit; a tool for GPs to learn from cases when a diagnosis of cancer was made only after a delay, or through an eventual emergency presentation. The initial project was funded by the Cancer Policy Team, Department of Health (via the NAEDI initiative) in 2008, and after further research and development at local and regional level (NAEDI, 2010; North East Yorkshire and Humber Clinical Alliance (Cancer) in 2012, and Yorkshire and Humber Strategic Clinical Network in 2014), it was subsequently taken up by the Royal College of General Practitioners as part of a successful national pilot in 2012-2013. **Based on the positive feedback received, the toolkit for GPs has been adopted nationally since 2016** on the RCGP website (<https://www.rcgp.org.uk/clinical-and-research/resources/toolkits/early-diagnosis-of-cancer-significant-event-analysis-toolkit.aspx>). In March 2020, it was included in NHS England's Directed Enhanced Service for early cancer diagnosis.

### Society

- The work of the perinatal mental health team has made a major impact at local, national and International level across three strands of work. Specifically, the work on Fear of Childbirth/tokophobia has resulted in the implementation, in partnership with two local NHS Trusts, of a clinical referral pathway for women who may be experiencing fear of childbirth. This represents the culmination of 10 years' work led by Prof Julie Jomeen and Dr Catriona Jones with all local NHS trusts and affiliated stakeholders which has involved the leading role in the development of a localised perinatal mental health service, pathways for care and practitioner training. Further recent work includes the evaluation of an expanded clinical service following the receipt of £25k of WAVE 2 government funding in 2019. A second strand of work led by Profs Colin Martin and Jomeen, is the development of a suite of measures which seek to determine practitioner confidence and knowledge, illness perceptions and professional issues in relation to the effective delivery of perinatal mental health care (PMHA, PIPS, PIMMHS). These newly developed measures have already been adopted in China and Turkey with several other requests for International translational currently being processed, e.g. Poland. **The third strand is the adoption of the Birth Satisfaction Scale-Revised, developed by Prof Martin, as a recommended global outcome measure in the International Confederation for Health Outcomes Measurement (ICHOM) Pregnancy and Childbirth standard set.** Since adoption by the ICHOM, the developers in Hull have had more than 100 requests to use the BSS-R as part either for outcome monitoring in standard clinical care or as an outcome measure in large randomised controlled trials.
- In 2018, in collaboration with Humber University Foundation Teaching Trust, a group led by Dr Jones began working with maternity providers to develop an evidence based clinical pathway for women who experience fear of childbirth/tokophobia. The work was funded by Ferens Education Trust and the International Society for Reproductive and Infant Psychology and is contributing to the development of services and support for women



experiencing severe levels of childbirth related fear. We have implemented a care pathway developed from our research, in the local NHS Trust in September 2019, and brought together a panel of UK and international experts to develop a consensus statement about tokophobia. From this seminal work the priorities for treatment and future research have been identified <https://blogs.bmj.com/ebn/2019/08/26/fear-of-childbirth-and-tokophobia/>). A key part of the work was to raise awareness of tokophobia and we used a presentation at the British Science Festival in 2018 to this end. This presentation sparked global coverage resulting in 139 media hits (including BBC World News, BBC2 – Newsnight, The Guardian, The Times, and Daily Mail). Two tokophobia articles published (February 2018: Jones, Wadehul, Jomeen; October 2018: Wadehul, Jones, Jomeen) via the Conversation articles have had a total of 194,011 reads and have been translated into French (45,392 reads) and Indonesian (2,693; all as of 1<sup>st</sup> May 2020). The articles have been further rebroadcast and published by 45 media titles and online sites.

- Prof Tom Phillips received funding from NHS England & Improvement to lead a project, in collaboration with the University of Southampton, to develop a consensus on the clinical competencies for hospital-based Alcohol Care Teams (ACT) which were being developed under the NHS Long-Term Plan (NHS England, 2019). The Long-Term Plan had identified the need to develop new multi-professional ACTs across the 25 hospitals with the highest burden of alcohol-related admissions (<https://www.england.nhs.uk/ltphimenu/prevention/alcohol-care-teams/>). This consensus framework will be used to develop training and support for these innovative teams. Firstly, an expert panel was formed, co-ordinated by the University of Hull, and a consensus project using Delphi principles was concluded in November 2019 identifying 72 clinical competencies across eight domains. Open access funding from NHS England was secured with the results being published in April 2020 (Phillips, Porter and Sinclair (2020) <https://doi.org/10.1093/alcalc/agaa024>). The outcomes of this study are currently being used by NHS England to inform the following: i) supporting the commissioning of new ATCs, with the first tranche of 12 services being located in Barnsley, Blackburn, Ealing, Great Yarmouth, Manchester, Nottingham, Oldham, South Tyneside, Southampton, Sunderland, Treliske and Whiston; ii) aiding the recruitment of clinical staff; iii) informing the expert group developing training and development initiatives for ACTs, which includes NHS England, Public Health England, Health Education England, Royal College of Psychiatrists and clinicians; and iv) the development of outcome measures for ACTs (see above website).
- Prof Lesley Smith was commissioned by the Institute of Alcohol Studies (IAS) in August 2018 to understand the implementation of alcohol guidelines by midwives across the UK. The work has identified the determinants of midwives' practice behaviour regarding addressing alcohol consumption during pregnancy. Following the launch of the report, a piece was written for *The Conversation* which had had 4,400 readers (31.12.20), 55% were from outside the UK indicating that the results have international interest. In addition, **the initial findings have informed the development of a practice-change intervention to support midwives implementation of alcohol assessment and advice during antenatal appointments.** This work has just been funded by NIHR RfPB and started in January 2021.

The study has also resulted in engagement in regional alcohol care pathways in the North East. Prof Smith has been invited to be part of the Local Maternity Services Alcohol and Pregnancy Working Group. The working group is developing an alcohol care pathway and training resources for midwives and health professionals caring for women during pregnancy and post-birth. The "All Our Health" framework produced by Public Health England is being embedded into the curriculum of nurses and midwives at the University of Hull, and this specifically includes an alcohol care pathway based on Prof Smith's seminal study, from 2019.