



ACADEMIC HEALTH SCIENCE CENTRES PRE-QUALIFYING QUESTIONNAIRE

Note: The accompanying “*Academic Health Science Centres - Invitation to Submit Pre-qualifying Questionnaire*” contains essential guidance on the information you need to provide when completing this proforma.

Please adhere to the page limits stated within each box. Only information submitted up to this page limit can be assessed. Please do not alter the margins of this proforma.

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

All fields must be completed.

Please insert your unique Reference Number into the Footer space provided.

1. DETAILS OF THE PROPOSED ACADEMIC HEALTH SCIENCE CENTRE (AHSC)

Name of the English NHS Provider/University Partnership:

Imperial College Academic Health Science Centre

Name, email and telephone number of the Lead Contact for the proposed AHSC:

Note: This will be the contact for all correspondence relating to this application.

Professor David Taube, AHSC Director
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Please list the members of the partnership involved in the proposed AHSC:

Imperial College Healthcare NHS Trust

- Hammersmith Hospitals
- St Mary's Hospital
- Charing Cross Hospital
- Queen Charlotte's and Chelsea Hospital
- Western Eye Hospital

Imperial College London

- Faculty of Medicine
- Faculty of Engineering
- Faculty of Natural Sciences
- Business School

2. STRATEGIC PARTNERSHIP (2 pages)

Please provide a brief overview of the NHS provider/university partnership which will support the proposed AHSC, to include the following:

- Details of the members of the partnership, including names of NHS Provider(s) and university(ies) involved;
- The track record of the partnership in aligning strategic objectives and working together to deliver these;
- Track record of aligning high quality research, health education and patient care;
- Three examples of added value gained from the strategic alignment of NHS provider/university partnership and the resultant achievements.

Imperial College Academic Health Science Centre (IC AHSC) is a partnership of Imperial College Healthcare NHS Trust and Imperial College London.

Imperial College Healthcare NHS Trust (ICHT) created in 2007 by the merger of St Mary's Hospital and Hammersmith Hospitals NHS Trusts, delivers high quality clinical services to a local population of over 2 million, and provides specialist services regionally and nationally. It has a diverse patient pool with over 1 million annual patient episodes, and is consistently rated as one of the safest hospitals in the UK with significantly low mortality rates [HSMR, 70, SHMI, 0.76 and the lowest death rates in low risk conditions, 0.17, (*Dr Foster, Hospital Guide, 2012*)]. ICHT has an annual turnover of £971m and has achieved all key performance and financial targets for 2012-13, including surplus and Cost Improvement Programmes and is on track to achieve Foundation Trust status. It is registered 'Without Conditions' with the Care Quality Commission (CQC), deemed 'at low risk of regulatory compliance failure', and one of 10 Trusts to be awarded Level 3 NHS Litigation Authority (NHSLA) Risk Management Standards across acute and maternity services (highest award possible).

Imperial College London (IC) is a world-leading STEM university comprising the Faculties of Medicine (FoM), Engineering (FoE) and Natural Sciences (FoNS), and a Business School. It is ranked 8th in the world, 3rd in Europe and 4th in the UK (*Times Higher Education World University Rankings (THE World Rankings) 2012-13*), and has 14 Nobel Prize winners within its alumni. In the most recent Research Assessment Exercise, 2008, IC was ranked 4th in research quality among other multi-faculty universities, 73% of research publications ranked 4* or 3*, the highest nationally, with a research income of £314m in 2011/12. IC has been granted Athena Swan silver status, one of only 3 universities to be recognised in this way. The FoM, established in 1997, brought together the major West London medical schools including the RPMS into one world class institution. It is one of Europe's largest medical schools, with 470 academic staff (with equivalent numbers holding honorary contracts) and c1300 under-and post graduate students admitted p.a. with a research income of c£161m in 2011/12. THE World University Rankings place the FoM 3rd in the UK and 5th in the world for 'clinical, pre-clinical and health' subject areas. The influence of our science is recognised with 72 Fellows of the Royal Society, 86 Fellows of the Academy of Medical Sciences, 20 Wellcome Trust Investigators (highest in the UK) and 20 National Institute Health Research (NIHR) Senior Investigators. There are 29 externally funded, peer reviewed research centres many noted herein.

Track Record of strategic alignment

Our co-ordinated approach is exemplified by the persistent operation of our Joint Executive over the 5 year span of the IC AHSC. Strategic alignment is synergised by the AHSC Joint Research Office (JRO) which co-ordinates all research management relating to the IC AHSC and a NIHR Biomedical Research Centre (BRC) focussed on interdisciplinary translation which has catalysed our ability to harness emerging knowledge and technology for better lives. IC AHSC has functioned seamlessly in our engagement with regard to service delivery coupled to academic excellence and this is exemplified in our integrated AHSC approach to the plans for service delivery reconfiguration in NW London, outlined in the NHS London "*Shaping a Healthier Future*" document. Our joint response as an AHSC sets out a coherent vision for academic healthcare delivery aligned to research and education across our individual sites and demonstrated how this alignment might be optimally configured with regard to capital infrastructure for IC and ICHT providing an exemplar of full strategic alignment.

<http://www.healthiernorthwestlondon.nhs.uk/sites/default/files/documents/Imperial%20Letter%20of%20Response.pdf> The IC AHSC is also appropriately nested within the Imperial College Health Partners (ICHP), recently designated as an Academic Health Science Network (AHSN) and our aligned strategic vision provides for real clarity in the roles of the AHSC and AHSN across a continuum of research from discovery to implementation and dissemination. Within this continuum, the IC AHSC will largely focus on discovery science and early stage translation (T1-T2) with the AHSN focussing on later stages of translation and dissemination of innovation (T2-T4). In the context of this translational alignment, we are also exploring ways of working more closely with the Royal Marsden Hospital and with the Institute of Cancer Research towards greater collaboration in research and its translation to cancer care.

Track record of alignment of research, education and patient care

Our strategic alignment in research, education and patient care has provided demonstrable benefits in our ability to plan and execute joint structures for translational research, deliver the necessary infrastructure, both capital and human to execute an integrated strategy and lastly, to utilise our collective resources to inform policy which affects patient care. We provide the following 3 significant examples of added value:

1. Joint structures for translational research include the NIHR Imperial BRC, one of the prestigious NIHR BRC's in the UK awarded £112m for 5 years (2012), the single largest BRC award. It supports 15 disease specific research themes including cancer, cardiology, gastroenterology and infection, supported by 4 cross cutting themes; bio-banking, genetics, genomics, stratified medicine and imaging. The successful harmonisation of research activities, including compliance and regulatory functions, into a single support function with the creation of the JRO has facilitated a 20% increase in patient participation rates in trials since 2011-12. The BRC, tightly linked to the JRO has served as an important vehicle for the translation of research, including from non-traditional domains such as engineering and chemistry, into outputs with the potential for real clinical benefit. Significant examples of our track record in effective translation supported by these joint structures include **(i)** historically, the discovery of efficacy and now worldwide implementation of anti-TNF therapy for inflammatory diseases, **(ii)** the identification of the utility of exemestane as a safer therapy in breast cancer, **(iii)** research in brain injury including Hypothermic Neural Rescue for hypoxic-ischaemic encephalopathy in neonates **(iv)** the outputs of the Royal British Legion Centre for Blast Injury Studies comprising civil engineers, scientists and military doctors collaborating with industry to reduce the impact in both acute and chronic settings **(v)** development of new treatment paradigms for Gestational Trophoblastic Neoplasia. **(vi)** development of radio frequency bloodless resection devices for hepatic surgery minimising morbidity in this complex area and **(vii)** the Confidence in Concept scheme supported by Medical Research Council (MRC) which has been successful in pump-priming early translational programmes and linking the FoM with FoE and FoNS. This is augmented by synergistic, devolved funding streams to enhance impact and facilitate multidisciplinary working provided by the Engineering and Physical Sciences Research Council (EPSRC), National Environment Research Council, Biotechnology and Biological Sciences Research Council and the Wellcome Trust.

2. Infrastructure (a) Capital Joint capital planning has provided the infrastructure necessary to align our clinical services with research, education and outreach to the community. The key example is the Imperial Centre for Translational and Experimental Medicine (ICTEM), a c£70m AHSC flagship centre for research and education on the Hammersmith site incorporating the Institute for Translational Medicine and Therapeutics (ITMAT), Imperial Cancer Research Centre (ICRC), British Heart Foundation (BHF) Cardiac Research Centre and the MRC Clinical Sciences Centre (CSC). At the heart of ITMAT is the NIHR/Wellcome Trust Clinical Research Facility (CRF) which occupies 1200m² with 2 wards for clinical research including Phase I trials. Further aligned developments include the MRC-NIHR Phenome Centre based on the Hammersmith campus in partnership with King's College London (KCL) and the Imperial Clinical Phenotyping Centre with analytical technology companies which provide exciting new capacity in metabolomics. Another exemplar of alignment is the Surgical Innovation Centre (SIC) at St Mary's Hospital, designed for high turnover minimally invasive surgery which houses IC's Clinical Skills Laboratory for under-and postgraduate teaching, and the Robotic Assisted Microsurgery Laboratory. The IC AHSC has developed a joint response to the Shaping a Healthier Future proposals, accepted as the template for development of the Outline Business Case for NW London.

(b) Human IC medical students receive clinical education in facilities of both the IC AHSC and the ICHP. In addition, there is very strong engagement by ICHT in the delivery of the intercalated year BSc's. We have jointly established a Health Education Board (HEB) which sets the direction for multi-professional education. In this context, we collaborate on postgraduate courses ranging from Biomedical Science to courses for Allied Health Professionals (AHP's). We are re-structuring our graduate programmes through our Health Science Academy (HSA) for multi-professional students. The MRC CSC and NIHR BRC jointly fund the Chain Florey Fellowships, a unique PhD scheme for clinicians training the next generation of clinician scientists. Lastly, we are developing a joint leadership programme with the IC Business School to deliver a cadre of professionals with the capacity to provide the future IC AHSC leadership.

3. Policy IC AHSC integrates policy as an additional component of its mission with our capacity to utilise data to generate consensus positions which can serve as the basis for policy and our ability to generate fora for high level policy discussion. The IC AHSC has played a leading role in the implementation and evaluation of the World Health Organisation (WHO) surgical checklist with the working group led by Prof Lord Ara Darzi. The NIHR Centre for Patient Safety and Service Quality (CPSSQ) directed by Prof Lord Ara Darzi and Prof Charles Vincent has led on the identification of key issues relating to patient safety and on the implementation of the WHO surgical checklist. Alignment between the National Centre for Infection Prevention and Management (CIPM) and ICHT has led to highly successful infection control policies at ICHT – a direct example of synergistic activity for patient benefit. This centre is tackling the issue of healthcare acquired infection via a multidisciplinary approach that includes organisational research, social marketing, epidemiology, laboratory-based programmes and education. The European Prospective Investigation into Cancer and Nutrition (EPIC (<http://epic.iarc.fr/>)), a multicentre prospective study based on 520,000 health volunteers recruited in 10 EEC countries, led by Prof Elio Riboli of the School of Public Health (SPH),

demonstrates our capacity for influencing national and international health policy. The MRC Centre for Outbreak Analysis and Modelling serves as a major global centre of excellence for translational research on the analysis and modelling of infectious disease outbreaks and has played a significant role in providing data informing policy with regard to pandemic infection. The Institute of Global Health Innovation (IGHI) represents a major policy vehicle, which initiated the Global Health Policy summit in London (2012) attended by academics, several global health ministers, with a keynote address by the Prime Minister. Our commitment to shaping health policy at a national and international level was highlighted by a series of sessions on maternal health, ageing societies, digital innovation in health care, technologies for global health, non-communicable disease, innovative delivery systems and financing health systems. The outputs were published in the *Lancet* and represent a major contribution to global debate on health.

3. ACADEMIC HEALTH SCIENCE CENTRE PROPOSAL (3 pages)

Please provide a brief overview of the strategy and vision for the proposed AHSC, to include the following:

- The goals, vision and purpose of the proposed AHSC for the five year period including key deliverables;
- A brief overview of the strategy to align research, health education and patient care within the proposed AHSC;
- Overview of the strategic objectives for the proposed AHSC, over the five years of designation, including for example specific themes or work programmes of focus;
- The AHSC partnership model and the role of each partner;
- Details of the proposed partnership leaders and leadership arrangements;
- How the partners will work together to deliver the goals of the AHSC;
- A description of the proposed governance arrangements;
- Evidence that the proposed AHSC is nested within an AHSN, and will have active engagement with other AHSNs nationally.

Purpose, vision, goals and strategy

The **purpose** of IC AHSC is to utilise excellence in research and education to transform health outcomes and to support the UK's globally competitive position in healthcare related industries by increasing societal and economic gain. The IC AHSC's **Vision** is that 'the quality of life of our patients and populations will be measurably improved by taking the discoveries that we make and translating them into advances, new therapies and techniques, and by promoting their application in the NHS and around the world, in as fast a timeframe as is possible'. The **Mission** is to make IC AHSC one of the top 5 global AHSCs within the next 10 years.

The **strategy** has the patient as central to all we seek to achieve and encompasses the following **goals**;

(i) To utilise the research strengths of IC combined with the critical mass of ICHT to enhance healthcare for patients and populations.

(ii) To create powerful new interdisciplinary synergies spanning the IC, IC AHSC and the AHSN to transform health care through translational science, bioengineering and informatics.

(iii) To educate and train the future generation of multidisciplinary clinical scientists capable of utilising new technologies for enhanced healthcare.

(iv) To translate research into new policies for the benefit of patients nationally and internationally.

(v) To create new wealth through innovation in healthcare in discovery science and in population-based translation.

We will do this by uniting our strengths in conjunction with the AHSN in a coherent programmatic manner based on complementary synergistic structures, clear and defined metrics together with a strong leadership structure.

Within the context of these clear objectives, our **strategy** towards delivery on our mission has a series of additional components adding to our value proposition.

(i) The IC AHSC is a partnership with the FoM and the FoE, FoNS and the Business School. This is reflected in our ground-breaking research focussed on the use of bio-engineering in surgery and for healthier living.

(ii) IC AHSC is focussed on early stage translation (T1-T2) within ICHT with a very coherent approach to late stage translation as a direct synergistic process with the AHSN. This provides us with clarity of mission in AHSC/AHSN integration and permits the nested structures to function seamlessly. Our ability to deliver excellence in healthcare and to integrate successfully with the AHSN is strongly supported by our School of Public Health (SPH) with its strengths in statistics, epidemiology, population genetics, bio-banking, exposomics and our Imperial Clinical Trials Unit (ICTU). SPH effectively serves as the bridge between IC AHSC and the AHSN in many respects. **(iii)** We see the development and implementation of health policy for the benefit of health care as integral to our mission. Our objectives focus on the generation of data integral to policies in areas such as patient safety, hospital acquired infection and outbreak analysis and in the shaping of national and international health policies through the Institute of IGHI, the global health policy summits and the AHSN. **(iv)** Through the Joint Working Agreement (JWA) of the IC AHSC, the technology transfer arm of IC, Imperial Innovations, becomes the technology transfer instrument of ICHT. This unique arrangement ensures a seamless capacity to translate new discovery for exploitation and implementation. **(v)** We intend to utilise our tight engagement with the FoE and FoNS to generate a leadership position in health informatics specifically with regard to data capture, storage and analysis building, for example on the £20m EU IMI initiative European Translational Information and Knowledge Management Services (e-triks, (<http://www.etriks.org/>)) led by FoE in which enormous data management capacity has been achieved for health. Our ability to perform complex analysis will be greatly enhanced by the planned Imperial Data Centre at the Imperial West site. **(vi)** IC's spatial strategy is now tightly aligned to that of IC AHSC with the creation of a research and translation hub based on campuses at Imperial West, directly adjacent to the IC AHSC Hammersmith campus. This will result

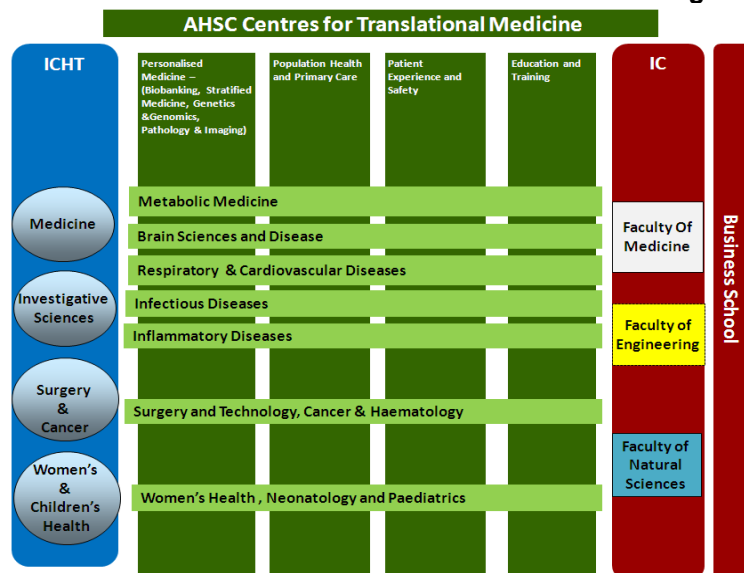
in the co-location of clinicians, engineers and physical scientists with industry in a location configured to enhance innovation. It is also anticipated that the SPH and the Imperial Clinical Trials Unit (ICTU) will also be located contiguous to this site, facilitating seamless integration with IC AHSC and the AHSN. **(vii)** Lastly, our capacities in stratified medicine incorporate genetics, genomics and imaging, with powerful and unique new capacity in metabolomics at the MRC-NIHR Phenome Centre. This national resource provides us with an additional strength in stratification which will be applied to medical and surgical care pathways.

In other aspects of delivery, IC AHSC has a global reach incorporating the creation of diabetes treatment centres in Abu-Dhabi (<http://www.icldc.ae/>) the Biobank in Qatar (<http://www.qatarbiobank.org.qa/about-us/what-is-qatar-biobank>), development of new approaches to cancer in Qatar and the partnership with Nanyang Technological University towards the creation of a new medical school in Singapore, the Lee Kong Chian School of Medicine (<http://www.lkcmedicine.ntu.edu.sg/Pages/index.aspx>) with a powerful research capacity in metabolic disease, neuroscience and infectious disease. In this context, we have pioneered the development of an entirely new medical curriculum at the cutting edge of educational innovation which will be introduced in Singapore this year; we anticipate that this will form the basis of substantial undergraduate educational change at IC. Our objective is to secure a two way exchange of knowledge and data with regard to best practice in our global operations.

Work programme - specific themes and deliverables

ICHT in discussion with IC has recently completed a strategic review of its healthcare delivery organisation with reconfiguration to four clinical divisions as described in **Figure 1**. This configuration maps closely to the IC AHSC Centres for Translational Medicine (CTMs) which constitute the AHSC translational delivery groups, based on a strategic coalescence of BRC themes. CTMs are the AHSC delivery groups, which build on BRC themes, consolidating initiatives in service, education, research and innovation using a multidisciplinary partnership approach with local work programmes. CTMs set the local strategy and priorities to support the delivery of the IC AHSC objectives within the clinical programmes, liaising with cognate areas within IC and function to translate the activities of the BRC through to benefits for patient care. All CTMs have an intrinsic delivery focus on **(i)** use of novel technologies and informatics, new diagnostic and therapeutic approaches to both common and rare disease **(ii)** the utilisation of integrated technological approaches in patient stratification **(iii)** the development of new treatment algorithms and delivery approaches for integrated care pathways **(iv)** the creation of data at a population level that can inform policy decisions **(v)** the development of new intellectual property and spin out opportunities in support of the knowledge economy. Some examples of such deliverables are provided below. A broader outline of research structures and outputs is provided in Section 4.

Figure 1 : Centres for Translational Medicine and cross-cutting themes



(i) The CTM for Metabolic Medicine will produce substantial outputs in the management of diabetes and obesity including new integrated care programmes and trials of novel appetite suppressants such as the PYY analogues, the development of smartphone platforms for insulin dosing and microprobe sensation-less glucose monitors. **(ii)** The CTM for Brain Sciences and Disease will further develop our national leading stroke service and pioneering research into Parkinson's and addiction, determine the efficacy of cholinesterase inhibitors in aiding post-stroke recovery and the pioneer development and use of new PET ligands. **(iii)** The CTM for Respiratory and Cardiovascular Diseases will further develop approaches to stratified medicine and specific therapeutic interventions in cardiac and pulmonary disease including further work on integration of genomics into therapeutic algorithms, clinical trials of renal denervation for heart failure and mini cardiopulmonary bypass. **(iv)** The CTM for Infectious Diseases, which encompasses the MRC Centre for Molecular Bacteriology, will explore microbial virulence and resistance in synergy with the highly translational

IC CIPM to further reduce hospital infection rates and develop new approaches to vaccines against HIV and Streptococcus pyogenes. (v) The CTM for Inflammatory Diseases will implement new diagnostic and therapeutic approaches to inflammation, including SYK inhibitors, across rheumatological and renal diseases utilising the large numbers of patients in our Lupus, Vasculitis and Transplant Centres. The Haemodialysis group in collaboration with the FoE will develop novel ways of creating arteriovenous fistulae for dialysis (vi) The CTM for Surgical Technology Cancer and Haematology will develop new technology-based patient care pathways and exploit MS-based intelligent surgical devices (iKnife) and HR-MAS NMR spectroscopy to analyse tissue samples to facilitate diagnosis and therapeutic options for patients with colon, breast and lung cancer. Novel microscopic surgical platforms for minimally invasive surgery will also be developed. (vii) The CTM for Women's Health, Neonatology and Paediatrics will focus on early pregnancy loss, the role of the vaginal microbiome and maternal immunisation to protect vulnerable neonates against Group B Streptococcal infections.

Partnership model, governance arrangements and leadership

IC AHSC has successfully managed the transition from a single governance model, which was not optimal in view of the separate reporting structures of NHS and the University. A formal review of the governance structures by Prof Lord Ara Darzi recommended substantial change in this 'top-down' model. The partnership has transitioned to a contractually-based overlapping governance model, formalised in a **Joint Working Agreement (JWA)**, which sets out the parameters, mechanisms and structures for how the partners work together. The partnership has clear, formal arrangements in place for the governance of intellectual property (IP) and approved processes regarding ownership and exploitation of foreground IP. The IC AHSC is governed by an independently chaired **Strategic Partnership Board (SPB)** and a **Joint Executive Group (JEG)** which permits appropriate reporting lines to stakeholders. The SPB, chaired by Prof Sir Gordon Duff, (Chairman, Medicines and Healthcare products Regulatory Agency), is the overall governance board of the AHSC and includes both IC President and Rector and the ICHT Chairman thus providing a direct line to and from the executive and governance fora in each partner organisation.

The JEG is the body directly responsible for successful implementation of the IC AHSC goals and for providing direction to the executive team. The JEG performance manages the delivery of the IC AHSC strategy and work programme. The IC AHSC is jointly led by the Dean of the FoM, Prof Dermot Kelleher and the ICHT CEO, Mr Mark Davies. The IC AHSC Director Prof David Taube, reporting to the Chairman of the JEG, is responsible for the implementation of the CTMs described above and for enhancing the relationship between the IC AHSC and the AHSN. Efficiencies are further strengthened through the cross-embedding of leadership in the operational structures of the partners. As examples of integration, the IC AHSC Director of Research sits on the Trust Management Board, the Medical Director of the Trust sits on the Faculty Board, the Vice Dean FoM IC sits on the Health Education Board and the IC Director of Education sits on the IC Strategic Education Committee. Furthermore all NHS consultant and consultant clinical academic posts are jointly agreed by the JEG, with right of veto, to ensure that new posts address the IC AHSC mission and strategy.

A key element of the governance is the co-ordinating and support function for research provided by the **Joint Research Office (JRO)** and **Joint Research Compliance Office (JRCO)**. These were established jointly and are responsible for the management of research, regulatory compliance, governance and research policy across the activity of the partners. Specifically, the JRO provides support for Investigators at all stages of the management of a research project and the JRCO oversees all research regulatory and compliance issues. Their remit is documented in the JWA; hosting of these offices by IC is the subject of an Operational Agreement with agreed standards. The **IC AHSC Research Committee** which has representation across the IC AHSC reports to the JEG on matters of strategy, financial and regulatory governance. Furthermore, engagement of the entire College (Engineering, Physical Sciences, and Life Sciences) with the FoM and ICHT is embedded within the AHSC Research Committee, to facilitate pull through of translational science.

IC AHSC and the AHSN

The IC AHSC is tightly nested within the AHSN with a very clear definition of roles based on the translational continuum. IC and ICHT are both formal voting partners of the AHSN. Both partners attend meetings of Imperial College Health Partners (IChP) with the IC AHSC Director in attendance. The AHSN Managing Director attends the IC AHSC JEG, and through these arrangements close working relationships have been established. There is clarity of purpose and division of functions between the two: the IC AHSC is primarily responsible for discoveries arising from basic and applied research, developing innovation and interface with industry with regard to discovery science and excellence as a provider of multi-professional education. The AHSN is responsible for the diffusion and adoption of discoveries including engagement with industry in this domain and new ways of delivering healthcare across a wider population. A **Joint Steering Group** comprising the AHSC, IChP and Northwest London Collaboration for Leadership in Applied Health Research & Care (CLAHRC) chaired by the AHSN Managing Director has been established to ensure that these components work efficiently together. This grouping will ensure that the new approaches in research, education and

innovation are strategically aligned and prioritised incorporating a joint strategic annual planning round to identify discoveries from the AHSC to be taken forward by the AHSN and CLAHRC. Lastly, we strongly support the development of London as a city of Health Innovation and Influence, by working closely with the London AHSC/Ns, Clinical Commissioning Groups and the Mayor's Office. Pan London working with all AHSCs and AHSNs will occur through the joint London Executive meetings and through consolidation of existing collaborations and BRC initiatives. An **AHSN Research Committee** has recently been established reporting to the ICHP Board chaired by the IC AHSC Director of Research, with a remit to coordinate translational research across pan London. We anticipate working strongly with other AHSNs on projects where critical mass or our specific aligned areas of expertise are levers for success. Such levers could also include large combined data sets and areas where working together increases discovery opportunities, including collaborations with industry.

4. VOLUME, CRITICAL MASS AND WORLD-CLASS EXCELLENCE IN BASIC MEDICAL RESEARCH AND THE ABILITY TO TRANSLATE FINDINGS INTO EXCELLENT TRANSLATIONAL, CLINICAL AND APPLIED RESEARCH ACROSS A RANGE OF INTERESTS (3 pages)

Please provide evidence of appropriate track record and capacity in research and translation to clinical and applied research, to include the following:

- An overview of the partnership's volume and critical mass of excellent world-class basic medical research;
- Evidence that the partnership has a track record and the ability to translate discoveries from basic research into world-class early translational, clinical and applied health research across a range of interests;
- Evidence that the partnership has a track record of translating findings from research in disciplines such as engineering, computer science and material science, and integrating these into excellent translational, clinical and applied research for patient benefit in order to improve health and healthcare delivery;
- Details of how the research excellence of the proposed AHSC will strengthen the partnership's ability to translate research into improved patient care across a range of interests, including how this will support the proposed strategic objectives of the AHSC;
- Three examples which display the partnership's translation of world-class excellent basic research into excellent translational, clinical and applied health research leading to excellent patient care and patient outcomes.

Overview of the partnership's volume and critical mass of excellent world-class basic medical research

IC is a world-leading university with strengths in medicine, science, technology, engineering, and business. Medicine is ranked 5th in the world, 3rd in Europe (*THE World University Rankings 2012-13*). IC total research income was £314m in 2011/12, of which £102.4m was from UK Research Councils, £66.5m UK charities, £50.7m UK government, £18.9m industry, commerce and public corporations. ICHT total research income was £49.2m in 2012/13 and income from commercially sponsored clinical studies has doubled to £4m. During 2012/13, there were more than 700 individual clinical research studies (commercial and non-commercial) actively recruiting over 47,000 patients or volunteers. As described earlier we have an NIHR BRC, awarded £112m for 5 years (2012).

Evidence that the partnership has a track record and the ability to translate discoveries

We have been successful in establishing and renewing the infrastructure essential for translation of discoveries, thereby sharing skills and resources with healthcare providers, research charities and industry. Specific examples include the Clinical Research Network (CRN)-accredited ICTU working with the Royal Brompton and Harefield NHS Foundation Trust (RBHNFT). ICTU delivers world class clinical trials of all phases at national and international levels, covering disease areas of global relevance. The NIHR Wellcome Trust Imperial CRF received a £10.9M renewal, the largest award of funding, to 2017. The Multiple Sclerosis (MS) Clinical Trial Unit is a highly active recruiter for MS clinical trials working in partnership with several pharmaceutical companies to translate research into breakthrough treatments for MS patients. Imanova Limited is a Pan-London centre for imaging sciences and their application to drug and diagnostic development, focussing particularly on novel PET imaging. Imanova is a highly innovative alliance between the MRC, IC, KCL and University College London (UCL). Imperial College Clinical Imaging Facility (ICCIF) is a new facility providing support for interdisciplinary research, integrating physical, biological and medical sciences. The MRC-NIHR Phenome Centre, the first in the world, is a high throughput, quality controlled analytical facility for large-scale metabolic research. This centre provides broad access to world-class capability in metabolic phenotyping, accelerating the translation of medical discoveries through better diagnostic tests and drugs, which are tailor-made for individual patients. The Imperial Bio Bank works closely with the pan-BRC Bio Resource and associated sub-groups on infection and immunity, cardiovascular, neuroscience and rare diseases. The London Life Sciences Prospective Population Study (LOLIPOP) is a major UK study investigating the mechanisms underlying heart disease, stroke, diabetes and obesity comprising detailed health assessments on 30,000+ South Asian and European healthy volunteers recruited through GPs in West London with ethical approval to recall participants by genotype or phenotype. The Multiple Sclerosis Society Tissue Bank, one of the biggest brain repository in the UK, and is the resource for over 250 national and international research projects. The Imperial Molecular Pathology Research Laboratories are equipped with state-of-the art technology providing diagnostic services and research support to ICHT and 150 haematology units in the UK and abroad. The AHSC Clinical Genome Laboratory provides infrastructure and state-of-the-art facilities for high-throughput genomic research to identify the genetic basis of heritable human diseases

alongside MRC CSC Genome Laboratory. The Clinical Genome Informatics Facility provides computational analysis of clinical genomics data with a focus on large scale sequence based datasets, via dedicated high-performance computing and storage resources to support clinical sequencing projects including personalised management of cancer, the development of diagnostic assays for inherited lipid disorders and mutation detection in renal and haematological disorders.

The MRC CSC is an embedded fundamental discovery science institute with core funding (£113m over 5 years), using modern biological approaches to study the molecular and physiological basis of health and disease, consisting of 3 research sections, Epigenetics, Genes and Metabolism, and Integrative Biology. The CSC brings world-class basic science into a clinical environment and is uniquely well positioned to undertake translational research through its position at the heart of the Hammersmith campus.

The Hamlyn Centre was established for development of safe, effective and accessible imaging, sensing and robotics technologies with a strong emphasis on clinical translation and direct patient benefit with a global impact. The centre is the champion for technological innovation and clinical adoption of robotic surgery for minimally invasive surgery, having been an early user of the da Vinci surgical robot for endoscopic radical prostatectomy, hiatal hernia, low pelvic and rectal surgery and robotic coronary artery bypass. Their current focus is on Biomedical robotics, within which the commercial surgical robot platforms, PROBOT (for prostatectomy) and ACROBOT (for knee surgery) have been developed. Vascular surgery in ICHT has made significant progress with the development of robotic assisted placements of endovascular prostheses in collaboration with Hansen Medical. IC in partnership with Chelsea and Westminster NHS Foundation Trust runs a Human Immunology laboratory for the International AIDS Vaccine Initiative enabling comparisons of immunological responses induced in volunteers who receive diverse prototype prophylactic HIV vaccines, which are being tested at field sites world-wide.

IC has produced more spin-out businesses than any other UK university, 140 since 2003. From 2011 Imperial Innovations raised £150 m to invest in businesses built on intellectual property developed at and associated with IC, Universities of Cambridge and Oxford, and UCL. This generates income for IC as a shareholder, to inventors through direct payments and to the wider economy by supporting small businesses, generating employment and training opportunities and transferable skills for students. Highlights include the \$100m (USD) sale of RespiVert (chronic obstructive pulmonary disease) to Johnson & Johnson, and the \$150m sale of Thiakis to Wyeth/Pfizer (Obesity Therapeutics). Other examples include the SLE neonatal ventilator, a market leader for many years, and the development by IC medical students of Torni-Strip, a cost effective tourniquet to reduce infection, now listed in the NHS supply chain.

Evidence that the partnership has a track record of translating findings from research in disciplines such as engineering, computer science and material science

Our research is supported by IC interdisciplinary research hubs focusing on improving healthcare. Key examples include the Institute of Biomedical Engineering (IBME) Research Technology Networks, which draw together researchers from all disciplines across IC to promote and coordinate multi-disciplinary research programmes for generation of novel IPs in specific therapeutic/disease management areas that will benefit patients. IBME includes the Cardiovascular Technology, the Metabolic and Endocrine Technology, Musculoskeletal Technology and Bioinformation Technology Networks, the Neurotechnology Initiative, and high throughput and high content systems community. The Centre for Synthetic Biology and Innovation is Engineering and Physical Science Research Council (EPSRC) funded partnership with KCL, focusing on an engineering framework for the design and optimisation of new synthetic biology parts, devices and systems, and applying synthetic biology to develop a wide range of novel biotechnologies. The Centre for Medical Engineering Solutions in Osteoarthritis, funded by the Wellcome Trust and EPSRC, brings together engineers, surgeons, rehabilitation therapists and scientists to focus on the early detection, intervention and prevention of osteoarthritis. The Royal British Legion Centre for Blast Injury Studies comprises civil engineers, scientists and military doctors. It fosters extensive industrial and international collaborative research with bioengineering companies to design and build Paralympic sporting equipment and enable greater independence for those with substantial disabilities. The Centre for Bio-Inspired Technology uses the application of engineering technologies to provide personalised healthcare devices for chronic disease management, developing novel methods for the continuous, real-time sensing or monitoring of bio-chemicals or bio signals to personalise healthcare in areas such as genetics, metabolic, neural and cardiovascular disease. Examples include the Bio-inspired Artificial Pancreas, other diabetes management systems and diagnostic lab-on-chips for early detection of disease.

We have excellent research capabilities in computer science, systems medicine/biology, epidemiology, biostatistics, e-Health and medical bioinformatics with collaborations spanning the FoM, FoNS and FoE. These include the Centre for Systems Oncology and Cancer Innovation and the Centre for Environment and Health, funded by MRC and Public Health England. The work of Prof Chris Toumazou has developed several spin out companies including DNA Electronics Ltd, Toumaz Technology Ltd, Futurewaves Pte Ltd. Prof Daniel Rueckert in the IC Department of Computing, in partnership with colleagues at KCL and Oxford received a grant of over €14m to use MRI to track brain connectivity in neonates and study neurodegenerative diseases. Our work in epigenomics has enabled greater understanding of disease mechanisms in type 2 diabetes by

Prof John Chambers, and respiratory disease by Prof William Cookson. We have significant expertise in Material Science. Research in regenerative medicine by Prof Molly Stevens in the Institute of Biomedical Engineering includes the directed differentiation of stem cells, design of novel bioactive scaffolds and approaches to tissue engineering to support large quantities of human mature bone for autologous transplantation and vital organs such as liver and pancreas. This has led to moves to commercialise the technology through spin-out companies and the creation of a clinical trial for bone regeneration in humans. In addition, IC AHSC is able to successfully tap into the basic science of Imperial College via collaborative competitions with the FoM through funding from Imperial Innovations, the MRC Confidence in Concept scheme, the Imperial BRC, the Wellcome ISSF scheme and other devolved funds.

Details of how the research excellence of the proposed AHSC will strengthen the partnership's ability to translate research into improved patient care across a range of interests, including how this will support the proposed strategic objectives of the AHSC;

From the establishment of IC AHSC, it was clear that the greatest challenge to translation of research into the clinic was translational pipeline sustainability. To address the challenge, we stimulated cross-Faculty research collaborations between FoM, FoE and FoNS and ICHT with a series of "speed-dating" sessions, widening detailed knowledge of capabilities at the level of the Principal Investigator. We followed this with a BRC project competition for collaborative projects in the translation of devices, diagnostics and therapeutics; 72 projects were supported over 5 years, driving new research into clinical study. In order to further broaden translatable research, we have established an Imperial Innovations Fund, a joint BRC Imperial Innovations – Therapeutic Primer Fund, which supports pump-priming of basic research, towards clinical application. The success of this initiative allowed us to compete for the MRC Confidence in Concept Scheme, giving devolved funds to universities (£700,000 to IC); we worked with Imperial Innovations, BRC and the Wellcome Trust to fund 21 new projects for devices, diagnostics and therapeutics, which will compete for public/private funding for progression into the clinic, in collaboration with industry.

We will strengthen our ability to translate research into improved patient care by continuing to bring together research expertise across IC AHSC and in collaborations described in our stakeholder engagement strategy including patients, other AHSCs, AHSNs and industry. Examples include the NIHR Rare Disease programme and the NIHR Diagnostic Evidence Co-operatives for point-of-care testing. We will further utilise the infrastructure support of the NIHR BRC to ensure that all patients are able to access dedicated clinical research facilities, and make best use of the BRC's focussed support for the platforms of patient characterisation through imaging, genotyping, molecular phenotyping and bio banking of consented samples. Patient characterisation is underpinned by an IT programme which will be linked with Cerner, the ICHT IT system to be introduced in Q3, 2013. An effective working relationship with the NIHR CLAHRC and the AHSN supports the adoption and diffusion of our discoveries to the wider population. Working with the Dr Foster Unit and the Business School at IC, stakeholders including patients, we will develop AHSC 'success' metrics to measure the impact of research, education and innovation to patients and healthcare. IC is a partner in the new Francis Crick Institute (FCI), an interdisciplinary medical research consortium of 6 of the UK's most successful scientific and academic organisations, the MRC National Institute for Medical Research, the Cancer Research UK (CRUK) London Research Institute, the Wellcome Trust, IC, UCL and KCL. By combining multi-disciplinary, specialist knowledge, expertise and resources, it will contribute to the knowledge of disease development and ways to prevent and treat illnesses such as cancer, heart disease, stroke, infections, and neurodegenerative diseases. IC is committed to placing clinical academics into the FCI, with a clinical base in ICHT, to facilitate this translational mission.

Three examples which display the partnership's translation of world-class excellent basic research into excellent translational, clinical and applied health research leading to excellent patient care and patient outcomes:

Example 1: Rheumatoid arthritis (RA) affects 0.5-1% of the population and can lead to pain, disability, economic losses and premature death. With the first clinical study at Charing Cross Hospital, the introduction of anti-TNF agents has profoundly changed the management of severe rheumatoid arthritis with over 1m patients having received treatment, and sales of 3 licensed TNF inhibitors over \$9b. Guidelines on anti-TNF inhibitors in RA were endorsed by NICE (2002). The combination of an anti-TNF inhibitor with methotrexate remains unsurpassed in reducing the signs and symptoms of disease and amelioration of joint destruction. The success of anti-TNF therapy provides proof that blockade of a single cytokine is capable of treating inflammatory disease such as RA. This has led to the development of other biological therapies and use of monoclonal antibodies to TNF for other chronic diseases and a considerable growth in pharmaceuticals.

Example 2. Hypothermic Neural Rescue: Birth asphyxia occurs in approximately 3:1,000 births (UK). 3 RCTs led by Prof David Edwards and Prof Denis Azzopardi proved that hypothermic neural rescue significantly improves outcomes for infants suffering birth asphyxia and increases normal survival by 50%. The treatment is used across the developed world, and as it is simple and cheap has the potential to make a significant impact in low resource countries where the burden of birth asphyxia is heaviest. The treatment has been recognised by NICE.

Example 3. Radiofrequency in Liver Surgery. Long term survival in liver cancer is predicated on surgical removal of liver tumours. Prof Nagy Habib with the FoE has developed radiofrequency (RF) devices which facilitate blood-less resection of tumours. Evaluation has shown that these devices significantly reduce blood loss, spare more functional portions of the organ, reduce length of stay and need for intensive care. The device has been successfully deployed in kidney, spleen, pancreas, uterus, lung surgery and contributed to NICE guidelines for RF in liver surgery. EMcision Ltd holds 18 patents, with global sales of devices.

5. EXCELLENCE IN PATIENT CARE (2 pages)

A description of the existing excellent patient care, including:

- Details, and relevant evidence of the NHS provider partners' excellence in delivering patient care within the local community and the wider NHS landscape;
- How excellence in research and health education will together support excellence in patient care and delivery of the best patient outcomes.

Details, and relevant evidence of the NHS provider partners' excellence in delivering patient care within the local community and the wider NHS landscape

ICHT has a record of excellence in safe, high quality, clinically effective and efficient patient care. We attribute success to close working with clinicians and academics, skilled staff and a patient focused culture that values research, education and innovation. Critical mass in patient population and staff, investment in all sites and technological assets, provide a solid platform from which to deliver acute and specialist services.

ICHT has consistently been rated one of the safest hospitals in the UK and has some of the lowest mortality rates (*Dr Foster, Hospital Guide, 2012*). We have achieved the highest levels of risk management accreditation (NHSLA level 3) and have consistently met CQC essential standards of care. Our reported harm rate arising from clinical incidents is better than national average, 90% no harm vs. 74% (National Reporting and Learning System (NRLS), 2013). The Safety Thermometer measures the quality of care by calculating proportion of patients receiving 'harm free care' (free from pressure ulcers, falls, catheter acquired urinary tract infections, venous thromboembolism). In March 2013, we reported delivering harm free care for 97% of patients compared with the national average, 92%, out-performing peers in NW London and best in class among AHSCs. As part of the implementation of Cerner Electronic Patient Records, Electronic Prescribing at the Bedside will be rolled out; this will increase medication safety and provide a rich source of data for research. Fetalink enables connection with medical devices in labour wards to the electronic record allowing patients to be monitored from anywhere in the organisation. ICHT provides operational management of the NRLS (capture and analysis of all reported clinical incident data) for NHS England and Wales and IC are carrying out research to enhance capabilities.

We have one of the top ranked Hyper Acute Stroke Units in the UK. The unit has been commended for its high performing cohesive multi-disciplinary team, strong leadership and for delivering service improvements in response to patient feedback, including the implementation of keyworker checklists, and improved patient information. The Major Trauma Unit is a 24-hour consultant-led centre, 1 of 4 in London. Together the centres make up London's trauma system, the first of its kind in the country, which is expected to save lives and reduce the risk of lasting disabilities. Renal Services with 9 satellite haemodialysis units provide dialysis and transplant treatment for 3,200 patients with end-stage renal failure. Survival rates, particularly on dialysis (93% at 1 year) are amongst the best in the country and better than expected (Renal Registry 2010). We are national leaders in high risk and antibody incompatible transplantation and the management of systemic vasculitis. The Multidisciplinary Diabetes Foot Service, established by the National Clinical Director for Obesity and Diabetes, Dr Jonathan Valabhji, through multidisciplinary team working, has driven innovative integrative care across healthcare boundaries, achieving the lowest internationally reported major amputation incidence with a reduction in major/ minor lower limb amputations within 12-24 months, avoidance of amputation in 83% of patients and improved patient satisfaction rates. We pioneered a Bariatric Surgical Centre, 1 of 2 National Centres of Excellence.

We are part of the Technology Program with the Infection Prevention and Control team focusing on adoption and diffusion to reduce healthcare acquired infections. An award winning smartphone application was developed to support decision making around anti-infective treatment and has had an impact on antimicrobial prescribing behaviour. Since its launch, it has been successfully adopted by most of our junior doctors with android/smartphones who use it daily to inform practice. Clinicians reported using the app, improved antibiotic knowledge and there has been a rise in number of antimicrobial prescriptions with stop review dates from 38% to 84%. This initiative has helped other NHS organisations in developing similar applications. We have achieved significant year-on-year reductions in MRSA of 38% and in C.difficile, 39%, with the number of cases for each infection below DH ceilings.

Allogeneic hematopoietic stem cell transplantation (HSCT) is the main curative therapy for many congenital or acquired disorders of the hematopoietic system. Our 5-year survival after HSCT is 65% for Hodgkin's Disease and follicular lymphoma and 86% for chronic myeloid leukaemia. The 1-year mortality post transplantation for Multiple Myeloma is 1.4% compared to the 5% UK average. The Paediatric Blood and Marrow Transplant Unit is the largest paediatric unit in the UK undertaking transplants for children (aged birth to 18 years) with serious non-malignant blood disorders. The disease free survival for up to 11 years post transplantation is 97% for Sickle Cell Disease and 96% for Thalassaemia.

The Neuromodulation group specialises in deep brain stimulation, receiving nationwide referrals for late stages of Multiple Sclerosis, Parkinson's disease, tremor and dystonia. The service has treated patients with very low

complication rates and significant clinical improvement. Innovation in surgical techniques has improved patient care and efficiencies through minimally invasive procedures with shorter length of stay and reduced complication rates. Robotic general, orthopaedic, urological, cardiac and endovascular surgery is commonplace in ICHT improving surgical precision, outcomes and length of stay. Population Health with a General Practitioner (GP) social enterprise, 'Partnership for Health', provides a clinical and cost effective innovative model of care with a divergence rate of above 80%, thereby reducing avoidable A&E attendances on our 3 main hospital sites.

I-track is a real-time patient experience feedback system developed by ICHT which is linked to a desktop reporting system. This enables front line teams and managers to view the results of patient experience online and in real time to take prompt improvement actions. Clinical areas that have shown sustained improvement and deliver an excellent patient experience include maternity services. Paediatric Allergy has developed services closer to the patient's home, with new community clinics and the introduction of Patient Reported Experience Measures to improve access within local communities to diagnosis, treatment and management of the most common allergic conditions in children, engaging GP's, Health Visitors, School Nurses, children and their families. An online questionnaire was constructed with the PICKER Institute and endorsed by DH. In addition to improved patient experience the service has seen a reduction in length of stay and acute readmissions. The 'My Action' Cardiac Rehabilitation Programme is a community-based integrated vascular health programme, led by Cardiovascular Medicine and the National Heart and Lung Institute (NHLI) which was recognised as one of the top 3 in the UK in the 2011 BHF Celebrating Cardiac Rehabilitation awards.

Delivering healthcare that meets patient and carer expectations is a key AHSC strategic objective. We are developing an integrated approach using research, education and improvement science to progress the patient experience. The 'Patient Experience Research Centre' (PERC) was established as a core function within the BRC theme of Population Health to develop collaborative research with patients. Working with the CLAHRC, we developed the My Medication Passport, carried by patients to improve medication safety. Following successful evaluation it is being developed nationally by the Royal Pharmaceutical Society.

We play an active role in the wider NHS landscape through our collaborations, sharing of skills and resources delivered as regional and national services, clinical training, and the influence of our subject matter experts who with colleagues drive healthcare changes. We provide National Specialised Services for Choriocarcinoma, Pancreas transplantation and the Reconstructive Surgery of the female genital tract in adolescents. Our collaboration in numerous clinical networks includes the North West London Critical Care, Haemoglobinopathy, Ophthalmology, Cardiac/Stroke, Sexual Health/HIV, Respiratory and Perinatal networks. We participate in several London Clinical Networks, which include the Central London NHS Emergency Planning Group, Children and Young People's Partnership for Health, North and West London Pain Medicine Network, North London Cancer Network, North London Psychotherapy Network, Pan-London Community Children's Nursing Network, Pan-Thames PICU Consortium, North West London Cancer Network and the London Trauma Network. We have contributed to over 35 NICE Guidance's and assist in shaping policy development through membership or advisory support to national and international expert bodies. These include the Governmental Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection and the Chief Medical Officer's National Expert Panel for New and Emerging Infections.

How excellence in research and health education will together support excellence in patient care and delivery of the best patient outcomes.

Expansion of our cadre of Clinical Education Fellows in areas interlinking our areas of best research and education with patient safety and simulation will be fundamental to enhancing patient care in the coming 5 years. We will appoint at least 4 such posts in the next 6 months, specifically tasked with translating patient experiences into multi-professional training opportunities. We will increase the number of nursing and AHP fellowships investigating clinical issues such as theatre safety, nutrition, pain management and dementia care and use the outputs from this work to directly improve patient care. The Health Science Academy will enable all healthcare staff to further develop knowledge and skills to support multi-professional research and models of evidence based care. The CTM for Patient Experience and Safety, supported by the Centre for Patient Experience Research within SPH, seeks to enhance compassionate, inclusive and evidence based care. Medical leadership programmes will enhance patient care by integrating the work of the best performing doctors in postgraduate training with managers, nurses and the Business School to enhance patient outcomes through joint facilitated working. We will continue to use large data sets to improve patient care, including our Health Foundation Shared Purpose scheme which aims to improve clinical teams' access and use of integrated workforce and clinical information through the development of an early warning predictive risk tool. We will further developing models of integrated care in collaboration with the SPH and commissioners. We believe that access to appropriate clinical trials should be readily available to all patients and, with the large number of research staff and studies in IC AHSC; we will continue to promote patient involvement in this area to improve care, outcomes and to generate knowledge. The close working relationship with the AHSN allows us to use new patient pathways or models of care to benefit patients outside the IC AHSC.

6. EXCELLENCE IN HEALTH EDUCATION (2 pages)

A description of the existing excellence in health education and training including:

- Details of the partnership arrangements in place with the Local Education and Training Board;
- An overview and relevant evidence of the partnership's excellence in providing, and delivering, undergraduate and post graduate health education and training across all related healthcare disciplines leading to improved patient care and outcomes;
- Details of how the integrated research and clinical environment adds benefit and value by providing an optimal health education environment;
- Evidence of education and training literature published in leading national/international journals.

Details of the partnership arrangements in place with the Local Education Training Board:

Education relationships in NW London are underpinned by undergraduate placements and postgraduate training rotations. This will be further reinforced in the new structure of our LETB, the Health Education North West London (HENWL). Since its formation, IC AHSC has worked closely with education providers through the former NWL Health Innovation and Education Cluster (HIEC) which included 20 partnership organisations. IC AHSC had representatives from IC and ICHT on the HIEC Management Board, with IC as lead University. We are a key partner in HENWL. Dr Jeremy Levy, IC AHSC Director of Education was recently appointed Director of Education and Quality at HENWL, Prof Jenny Higham, Vice Dean FoM IC, represents HEIs and Prof Janice Sigsworth, ICHT Director of Nursing, is also a member of the HENWL Board which is linked to the IC AHSC through the ICHT Health Education Board and IC Strategic Education Committee.

We are a major provider of postgraduate medical education and training within NW London. ICHT won competitive bids as Lead Provider of training for Core Trainees in Medicine, Surgery and Psychiatry, and for Higher Specialty Trainees in 19 specialties and is currently bidding for many of the remaining specialties. As Lead Provider, we run and quality manage training programmes to ensure excellent outcomes and drive improvement in education and training. To support increased GP training across London, Imperial GP Speciality Training was launched (2012) with local practices to develop a new generation of GP's educated and trained to the highest standards as leaders and practitioners. We continue to work closely on a pan-London basis with other LETBs and with Lead Providers to enhance the quality of training. Significant improvement has already been demonstrated in several commissioned specialties arising from an educational leadership team and strong governance.

Overview and evidence of the partnership's excellence in providing, and delivering, health education and training to improved patient care and outcomes

IC is a world leading University with a reputation for excellence in science based education and training with some of the world's best clinical academics. The FoM encompasses one of the largest UK Medical Schools (2,043 Undergraduate students, 9 applicants per place, average A level scores 391 (Jan 2013)). The School offers an undergraduate and graduate entry route (for students with a good 1st degree in Biological Sciences) to obtain an MBBS qualification, BSc in Biomedical Science or BSc in Biomedical Science with Management. The MBBS course which includes a BSc Degree has an innovative curriculum which fosters scientific enquiry, acquisition of skills critical for research and clinical competency. An MBPhD programme is offered to students wishing to continue research to doctoral level. Our National Student Survey score this year was disappointing. Although we continue to outperform the London average, overall satisfaction at IC fell 9 points to 83% in 2012. We have developed a focussed programme of work to address this.

The NW Thames Foundation School remains one of the largest programmes (116 Academic trainees annually) and remains oversubscribed (1:7, 2013). This year, 48 Imperial students succeeded in obtaining a position on an Academic Foundation programme, the highest of any Medical School. Our Masters courses provide a pipeline of students for PhD programmes, allowing exposure to a specific academic discipline. Over 1200 students are currently studying for a research degree (PhD, MPhil, MD (Res)) or one of the 34 Masters courses within the FoM. We were awarded 3 prestigious clinical PhD programmes: the Wellcome Trust Clinical PhD Programme, the Wellcome Trust/GSK Translational Medicine and Therapeutics Programme, and the MRC/BRC Chain Florey Fellowships. In total, there are 300+ Clinical Research Training Fellows (CRTFs) studying for higher degrees, 30% supported by the MRC, Wellcome Trust or NIHR. We continue to be successful in competing for places on the NIHR Integrated Academic Training Path and have been awarded the second highest number of academic trainees in the UK, with 241 Academic Clinical Fellows (ACFs) and 86 Clinical Lecturers (CLs). The success of our academic trainees has been outstanding; over 90% of our ACF's, have obtained a competitive CRTF to work for a PhD. We were also successful in bidding for HEFCE Clinical Senior Lecturers (CSLs), with 35 awards (second highest nationally).

Postgraduate medical education continues to improve, evidenced by recent inspections and a large reduction in the number of red flags (poor performance) in the General Medical Council survey. The ICHT Directors of Medical Education have initiated improvement actions including an on-line internal trainee survey for real-time

feedback. We are also committed to developing clinical academic careers in non-medical healthcare professions, and have been awarded the highest number of NIHR Doctoral and Post-Doctoral Fellowships in the UK.

Details of how the integrated research and clinical environment adds benefit and value by providing an optimal health education environment.

Our education environment is one in which all teaching is underpinned by clinical expertise, internationally competitive research and draws on a wide range of academic skills within the FoM, FoE, FoNS and the Business School. Graduates have the fullest opportunity to acquire scientific knowledge, clinical and non-clinical skills and professional attitudes required for the care of patients and research. Our commitment to developing a culture where education is highly valued may be seen in the contribution of all Consultants to education and training, which is reviewed at appraisal, and all new consultant appointments are approved by the JEG to ensure that the appropriate number of Programmed Activities for teaching and research are included. Examples of our optimal environment include the introduction of a 'buddying system' with pharmacists for medical students on placement. HIEC projects led by ICHT have added value to the wider health education environment: 'Your Opportunity for Development, Education and Learning' (YODEL), an interactive database which improves access, value for money and transparency of education opportunities, is being rolled out to regional providers. The Nutrition and Dietetics Research Group contribute 3 modules to the national e-learning package for foundation year doctors. We provide education to patients across primary and secondary care including the community midwifery based educational service for female genital mutilation, awarded the Brook Adult Sexual Health Service of the Year, 2013.

A number of innovative appointments have been made which aim to add value and benefit. These include Patient Safety Fellows working across the Education Directorate and the CPSSQ, a Fellow in Integrated Care with the Imperial GP Scheme and ICHT, 2 new Clinical Education Fellowships to support undergraduate medical teaching, and 2 academic posts between the Trust and Bucks New University (Professor of Nursing and a Reader). The recent Wellcome Trust award of an Engagement Fellowship to Prof Roger Kneebone, aims to develop public engagement as a research tool.

We are committed to developing academic careers across all healthcare professions and providing opportunities for Continuing Professional Development (CPD). ICHT has an excellent track record in utilising funding for non-medical continuing professional and personal development, such as development of staff in Bands 1- 4, nurses, AHPs and biomedical scientists, including NVQ Apprenticeships for Therapy Assistants and enhanced research skills for nurses with the first cohort of Nursing MRes students who graduated in May 2012. We aim to increase the number of nursing staff with Masters qualifications, by offering additional resources and opportunities to study and the Imperial Progressive Academic Model enables students to progress from a BSc (level 1) to a PhD undertaking research in practice (level 3). We have worked with RBHNFT on remote patient monitoring and management to educate nurses and AHPs in monitoring heart failure or chronic lung disease at home to avoid unnecessary hospital visits.

We run a 'paired learning initiative', linking senior SPRs with ICHT managers, which has improved outcomes, quality, innovation, and productivity by increasing communication and collaboration. It was highly commended by the BMJ and won the prestigious Elisabeth Paice Award and is now being rolled out across London. We host several Fellowships in Clinical Leadership, ('Darzi' Fellowships') which is a highly successful initiative, acknowledged by the adoption of the model in many other areas of the country, and a nomination for a Healthcare People Management Association Excellence in the Human Resource Management Awards, 2010.

An extensive range of speciality specific simulation activities are offered in a safe environment for trainees and are embedded in clinical training programmes, including 'point-of-care' simulation training which has been successful in Adult, Paediatric and Neonatal ICU's and the Major Trauma Centre. The Multidisciplinary Paediatrics Centre for Training Simulation (IMPACTS) situated next to the paediatric wards features a SimBaby interactive mannequin to enhance training in 'real time' and is filmed for debriefings. Clinical simulation has been introduced into resuscitation training. The NIHR CPSSQ award-winning patient safety training programme, 'Lessons Learnt: Building a Safer Foundation', has trained 1,000 junior doctors around the UK and created a cohort of 100 expert faculty, with 30+ quality improvement projects undertaken, including new methods of teaching for nasogastric tube insertion and the involvement of junior doctors on Trust Boards; it is now an embedded training programme for our foundation doctors.

Evidence of education, training literature published in leading national/international journals.

Between 2008-13, IC AHSC published over 500 papers on matters related to education and training. There were 80 articles published in leading national and international journals with an impact factor >4 and 10 with an impact factor >10, comprising 2 in *The Lancet*, 7 in the *BMJ*, 1 in *JAMA*. Publication themes comprised global health education, medical student education, student safe practice and simulation training. Selected examples include; Kneebone R, Aggarwal R. Surgical training using simulation. 2009 *BMJ*; 338;b1001, Johnson O, Bailey SL, Willott C, Crocker-Buque T, Jessop V, Birch M, Ward H, Yudkin JS. Global health learning outcomes for medical students in the UK. 2012 *The Lancet*; 379;2033-2035 and Long S, Neale G, Vincent C. The competent novice: practising safety in the foundation years. 2009 *BMJ*; 338; 887-890.

If you have questions about the completion of this form please e-mail Jane Sinclair at jane.sinclair@nihr-ccf.org.uk.

This form must be submitted by **1:00pm on 31 May 2013**.