Job Description for NIHR Academic Clinical Fellowship in Intensive Care Medicine (Theme: Digital) ST3 Entry

1. Job Title.
Academic Clinical Fellow in Intensive Care Medicine at Imperial College London

2. Duration, timelines, and eligibility of post.
Applications are sought for a 3-year, Academic Clinical Fellowship (ACF) position in Intensive Care Medicine. Candidates should be appointed to the Intensive Care Medicine (ICM) clinical specialty training programme at the time of starting the ACF post. The applicant should have an interest in, and outstanding potential for, a career within academic intensive care medicine.

The aim of the post is to allow the successful applicant to generate pilot data and prepare an application for a personal fellowship or other grant to support undertaking a higher research degree (i.e., PhD or MD). If successful in obtaining further funding the candidate would apply for time out of training for research (OOPR) to pursue a higher research degree. At the end of this time, the candidate would then re-enter the clinical specialty training programme.

Fellows unsuccessful in obtaining such funding at the end of the ACF will be able to convert their NTN-A number to an NTN and continue ICM specialty training.

Applicants wishing to dual train in another clinical specialty in addition to the ACF post in ICM should contact the ICM academic TPD to ensure timelines for clinical and academic training are planned in advance.

3. Research institutions in which training will take place
The academic training will be based within the Imperial College academic Division of Anaesthetics, Pain Medicine and Intensive Care (APMIC). The section works closely with the other units in the Department of Surgery and Cancer and broader Faculty of Medicine, as well as Departments within the Faculty of Natural Sciences and Engineering at Imperial College.

Imperial is a leading global centre in ICM and anaesthesia research. In the 2017 Centre for World University Rankings, critical care at Imperial was ranked 9th in the world and the top centre outside of North America. Our group has had many high impact publications (NEJM, JAMA, Lancet Respiratory Medicine and Nature Medicine) and major grant funding (>£12M in the last 5 years).

4. Timetabling of clinical and research time
Research will be arranged in 3 months blocks, x3 over three years. Generally, the first year consists of 12 months clinical training, second year 6 months research and 6 months clinical training, third year 3 months research and 9 months clinical.

This is only a general guide. The exact programme will be worked out depending on the Fellow's previous experience and both clinical and research training requirements.

5. Description of research component of programme

The primary host of this programme will be the Division of Anaesthetics, Pain Medicine, and Intensive Care (APMIC), which brings together clinical and basic scientists with internationally recognised research in anaesthesia, critical care and pain with emphasis on producing high-quality, high impact basic and translational research in these areas. The Division works closely with the other units in the Department of Surgery and Cancer and conducts various active collaboration studies across Imperial College and its affiliated NHS Trusts within the Imperial Academic Health Science Centre, as well as other academic institutions in the UK and Europe.

There is consistent focus in the Division on mechanistic efforts investigating inflammation and metabolic responses underlying organ injury and extracorporeal life support, including ECMO. Translational research includes the use of "omics" data and Artificial Intelligence to personalise treatment for critically ill patients and is a key area of development alongside an increasing array of NIHR portfolio studies and clinical trials, including REMAP-CAP and SepTiC, that build on the mechanistic knowledge.

Supported by the wide range of expertise and opportunities available in these frameworks, the successful candidate is expected to fully integrate with the existing perioperative, pain and critical care research themes, and further develop her/his own independent line of research that is closely related to other activities within the Division. This post is within the digital theme and therefore the project chosen by the candidate must relate to this. The division carries out research in several areas related to the digital research theme, including 'big data' such as genomics and metabolomics: projects using artificial intelligence and machine learning methodology and precision medicine. The Academic Clinical Fellow will have the full support of the academic department, and will be managed by the Head of Division, Professor Masao Takata and/or a senior academic from one of the signature research themes. In addition, the fellow will be assigned an independent academic and a clinical mentor.

In the three years of the post there will be a total of nine months of fully protected research time, which will enable the Fellow to undertake a preliminary research project relevant to ICM in an Imperial College research group and ultimately to prepare an application for a competitive, peer-reviewed research training fellowship leading to the award of a higher degree. The exact delivery of this research time will be jointly determined by Dr Antcliffe and the clinical TPD, considering the individual clinical training and academic training needs of the Fellow and in discussion with them and their selected academic supervisor. Dr Antcliffe will, at an early stage, assist the Fellow to identify a suitable academic supervisor by means of a programme of visits, within APMIC.

Research opportunities include:

- **Extracorporeal life support (ECLS)**: examining the cellular and immunological mechanisms underlying severe respiratory and cardiac failure in patients supported on ECLS. Ongoing projects include investigating the role of microvesicles as diagnostic markers and/or crucial inflammatory

mediators in cardiothoracic perioperative and critical care, including transplants and mechanical cardiac support (LVAD or ECMO). We use extra-corporeal circuits (e.g. human ex-vivo lung perfusion) to discover novel ways to biologically improve rejected transplant organs as well as examine underlying mechanisms of organ injury and how to provide optimal organ support. The ECLS service is a multidisciplinary service which incorporates acute injury but also recovery and rehabilitation.

- **Investigating the links between metabolism and immune function,** in the pathogenesis of immunosuppression and wasting in perioperative and critical care. As the population having major surgery and being treated in intensive care gets older this work is investigating the link between frailty and multimorbidity on weaning from mechanical ventilation and other organ support, and long-term rehabilitation from critical illness. With colleagues from musculoskeletal science, we are developing a programme to explore muscle, nerve and brain function after critical illness and how this may impair patients' recovery after critical illness.
- **Improved phenotyping of sepsis and ARDS patients**: We are using DNA, RNA, metabolic and inflammatory data, breath-by-breath physiological analysis, and clinical data from the electronic heath care records to phenotype these acutely unwell patients and individualise better and optimise treatment strategies. We have recently shown in a double-blind RCT that response to treatment in sepsis varies by RNA-based signatures in blood. These projects link with bioinformaticians in the Data Science groups in both the Faculty of Medicine and Faculty of Engineering at Imperial.
- **Artificial Intelligence in Critical Care and anaesthesia**: We are developing the concept of the AI Clinician used to guide fluid and vasopressor therapy in sepsis. We are now developing a real-time clinical decision support system to help guide clinical care in these critically ill patients and will test this within the Imperial Trust before rolling out a multi-centre RCT. We are an integral part of the UKRI Doctoral Training Centre for AI in Healthcare based at Imperial and are using large datasets (the National Emergency Laparotomy Audit [NELA] and the Whole Systems Integrated Care System [WSIC]) to develop new AI systems to improve acute care.

The Fellows will be also required to undertake the training offered in education, transferable and generic research skills offered by Imperial College. Further information about the Imperial ACF training programme is available from the Imperial Clinical Academic Training Office at https://www.imperial.ac.uk/medicine/study/clinical-academic-training-office/ Fellows will also be expected to obtain competencies in education by engaging in the teaching activities of APMIC.

6. Description of clinical training component of programme

Wherever possible, trainees will be placed within the Imperial College Healthcare NHS Trust or area of London for clinical and academic placements, to improve continuity of training and their research productivity. Clinical training opportunities will be matched to the needs of each trainee. Placements will be monitored to ensure high-quality training and educational supervision. The ICM training programme is Pan London, and trainees may need to be placed in different London hospitals according to their clinical training needs.

Stage 1: Clinical placements will be designed to deliver experience in Medicine, Anaesthesia and ICM. ST3 and ST4 posts will be allocated flexibly to provide the most balanced trainee portfolio as per the CICM curriculum. This will take into account each trainee's previous core training and specialty training stage level upon entry into the ICM programme, their future career plans, and designated academic centre.

Stage 2: The programme will provide excellent ST5/6 level opportunities for training in neuro, cardiac and paediatric ICM in 3-month block pro rata. These will be in centres of excellence across the whole of London, with placements at or in the closest available centre to the trainee's academic hub.

Stage 3: ST7 ICM training will occur after completion of the ACF post. This period will enable the trainee to develop their leadership and management skills to fulfil a role as an ICM consultant.

The ACF will be for 3 years within the pan London Intensive Care Medicine Training programme (ST3-5). The exact details of this training and location will depend up on the candidate's previous experience and further training requirements. This will be tailored to the ACF with consultation between respective TPD, Research Supervisor and ACF.

Upon joining the ACF programme, yearly ARCPs (Annual Review of Competency Progression) will occur along with annual review of research progression to ensure clinical training requirements are met according to the FICM curriculum.

7. Academic Programme Director name
Dr Nishkantha Arulkumaran, (n.arulkumaran@nhs.net)

8. Clinical Programme Director name
Dr Russell Hewson (Lead Training Programme Director) Russell.Hewson1@nhs.net
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9. Programme contact for further information (phone or email)
Dr David Antcliffe (d.antcliffe@imperial.ac.uk)

10. NHSE contact:
Specialty Team https://lasepgmdesupport.hee.nhs.uk/support/home
Recruitment Enquiries - https://lasepgmdesupport.hee.nhs.uk/support/home

11. Useful websites for further information
https://www.nihr.ac.uk/explore-nihr/academy-programmes/integrated-academic-training.htm

12. Confirmation that the post attracts an NTN (A)
Yes

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