IHE summer studentships 2022 – list of projects

Version published on 29th April 2022

Students please note: Some additional projects might be included until the deadline for students’ submission. You can access always the most updated project list via the website. However the current project list is a good representation of the projects that are on offer and so you can submit from now. But if you want to wait until closer to the deadline, at least you should prepare a draft of your application considering these current projects to ensure you are ready to submit at any time.

|  |  |
| --- | --- |
| **Project number** | **Project description** |
| 1 | Project title: Studying the spino-pelvic relationship prior to total hip replacement: Co-registration of two image modalities.  Clinical unit: RNHO- Surgical Technology Laboratory  Lead clinicians: Mr Johann Henckel, Orthopaedic Surgeon  Project outline: Significant variability has been reported for pelvic orientation in patients with hip arthritis with almost all individuals having a unique pelvic tilt which changes over time and with daily activities. Understanding the magnitude of these changes is important as it influences surgeon’s decision regarding the optimal implant orientation for the patient (e.g. to reduce the risk of dislocation), however this has been challenging to accurately measure using standard imaging modalities. Some of the main complication associated with hip replacements include dislocation, impingement, reduced range of movement and accelerated implant wear.  A better understanding the impact of pelvic orientation on implant function will improve surgical planning and execution as well as outcome. Although most hip dislocations occur in either standing or sitting position, the safe zone for implant position is currently defined using the supine position. Computed Tomography (CT) is becoming the gold standard imaging for 3D surgical planning and is almost always performed with the patient in the supine position (non-functional). Biplanar radiography, EOS, offers upright full-length imaging to accurately measure patient’s anatomy. However, it does not offer the 3D information that CT offers. The aim of the project is to study the magnitude of variation in pelvic tilt from lying to standing in patients undergoing hip replacement by seeking to accurately co-register these two imaging modalities (CT and EOS) using standardised coordinate systems. The project will include 3D image analysis and the use of state-of-the-art software solutions for image segmentation and registration.  Outputs: The change in pelvic orientation form lying (non-functional posture) and standing (functional posture) will inform planning of implant component orientation (e.g. acetabular cup position) to optimise function, range of movement and implant longevity. We would expect the results of this study to be written up as a manuscript for peer-review.  Skills and clinical observation opportunities students will gain from this project: Clinical Observation Opportunity (e.g. attending operating theatres, outpatients to learn about the clinical problems linked to the project)  UCL staff involved on the project: Dr Anna Di Laura, UCL IOMS, UCL Mech Eng  Pre-existing skills needed for this project: NA |
| 2 | Project title: Understanding early failure of a novel antiallergic knee implant design: A retrieval analysis study   Clinical unit: RNOH - The Implant Science Centre  Lead clinicians: Mr Johann Henckel, Orthopaedic Surgeon  Project outline: Unicompartmental knee arthroplasty is a well-recognized procedure in treating some patients with advanced knee osteoarthritis. These implants are usually manufactured from alloys of cobalt, chromium and nickel. Some patients however have a hypersensitivity to these metals and are unable to safely be given these. One proposed solution used in patients is to coat the implant surfaces with an antiallergic coating to protect them from the underlying metal. We have however recently collected 20 of these implants at our centre that have failed in patients due to them loosening from the bone.   Aim: To forensically analyse these implants in order to understand their mechanisms of failure.   Methods: You will learn how to perform detailed macro- and microscopic analysis to characterise these implant surfaces. You’ll be trained in the use of optical profilometry to further interrogate the implants and how to use metrology equipment in the centre to quantify surface changes on each knee and the impact of this on their failure. You will then compare you’re engineering analysis with clinical and medical imaging data for each patient, to identify the surgeon, implant and patient factors that were involved in early failure.  Outputs: It is expected that you will generate data from your analysis that will be used to prepare a manuscript for submission to a peer-reviewed academic journal.  Skills and clinical observation opportunities students will gain from this project: The student will be given the opportunity to attend out-patient clinics and the operating theatres at the RNOH (subject to any COVID-19 restrictions).   UCL staff involved on the project: Dr Harry Hothi, Implant Science Fellow, UCL IOMS LIRC, UCL Mech Eng  Pre-existing skills needed for this project: Student with an interest and background in bioengineering, biomechanics in orthopaedics and multidisciplinary research. |
| 3 | Project title: Perspectives on the use of digital apps among chronic pain patients and health professionals  Clinical unit: RNOH- Chronic Pain Team  Lead clinicians: Dr Roxaneh Zarnegar  Project outline: The project will examine the use of digital apps in chronic pain management, this will include initial design of potential app as well as pilot testing with patients.  Outputs: - A review of the use of digital apps in chronic pain management - A study of patient perspectives of the use of digital apps in RNOH patients - A study of health professional perspectives of the use of digital apps using a social media questionnaire   Skills and clinical observation opportunities students will gain from this project: Clinical Observation: Observation in the chronic pain clinic to gain an understanding of patients’ problems Observation in the pain management programme to gain an understanding of behaviour change and how it can help patients Research:  - Literature review of digital apps in chronic pain - Design of questionnaires for patients on the use of digital apps - Design of questionnaires for healthcare professionals and data collection through social media - Data analysis - Preparation of a report of the study question   UCL staff involved on the project: NA  Pre-existing skills needed for this project: Previous experience with apps and designing apps would be beneficial, previous experience with data collection and literature review would also be beneficial, but not a requirement. |
| 4 | Project title: Design of force measuring apparatus for investigating screw compression  Clinical unit: RNOH -Foot & Ankle Surgical Team  Lead clinicians: Mr Karan Malhotra, Consultant orthopaedic surgeon  Project outline: In orthopaedics the screw is a critical device. It is a device which converts rotation force into a linear compression and must maintain that compression and resist pullout and distraction. To achieve these goals various screw designs have been developed varying the pitch, thread depth and thread flank configuration. However it is not known which screw types generate optimal compression and resistance to pull out.  In order to measure and compare screws a purpose designed apparatus will be required to measure compression force generated and pull-out strength. This project will be aimed at designing and building an apparatus for measuring force generation by screws (compression and pull-out strength). This may later be used as part of a larger project aimed at investigating and comparing various screw designs and is a critical first step.    Outputs: Designing an apparatus for measuring force generation by screws (compression and pull-out strength)  Skills and clinical observation opportunities students will gain from this project: Students will have the opportunity to join consultant surgeons in clinic and theatre to see the role of screws / metalwork in clinical practice, and to learn about the biomechanical and biological aspects. There will be ample opportunity to discuss clinical applications and discuss design.   UCL staff involved on the project: NA  Pre-existing skills needed for this project: Interest and some knowledge in biomedical engineering and/or biomechanics. |
| 5 | Project title: A study on the validity of pre-operative planning software with a lateralised reverse geometry shoulder prosthesis: a comparing of post-operative clinical motion  Clinical unit: RNOH -Upper Limb surgical team  Lead clinicians: Mr Addie Majed & Mr David Butt, both consultant shoulder surgeons  Project outline: Continue to develop the SciKit-Surgery Glenoid - Open Source Toolkit for Glenoid Version Measurement project from last year’s success. The previous pilot study was successful demonstrating the computer bioengineering solution to measuring glenoid version. This was presented at the SPIE Medical Imaging conference, San Diego 2021.  The aim of the study would be to expand on the study numbers, an develop further novel IT solutions to measuring glenohumeral bony morphology with a view to developing bespoke tools for pre-operative surgical planning. This project extension and development has been agreed in principle by Dr Thompson. The next agreed plan is to compare different methods of measuring glenoid version and planning positioning of implants, using RNOH's historic data to compare 5 different methods across ~200 CT scans. From this we aim to draw conclusions on the best way to measure clinically and publish this leading to improved patient care.  Outputs: • Further podium presentation in Bioengineering and Shoulder Surgery Society forums • Paper publication  Skills and clinical observation opportunities students will gain from this project: • Clinical outpatient attendance to discuss glenohumeral anatomy and bony morphology from pre-operative planning perspective • Pre-op planning meeting to discuss surgical approach to improve understanding of glenoid anatomy and surgical difficulties • Theatre attendance to demonstrate in-vivo surgical solutions to ‘on-table’ glenoid measurement   UCL staff involved on the project: Dr Stephen Thompson, UCL Medical Physics and Biomedical Engineering, UCL Centre for Medical Image Computing  Pre-existing skills needed for this project: Interest in healthcare engineering, medical image computing and understanding of the medical image computing. |
| 6 | Project title: Developing haptic feedback for Intraosseous Transcutaneous Amputation Prosthesis (ITAP): modelling bone anchoring  Clinical unit: RNHO - Orthopaedics  Lead clinicians: Miss Deborah Eastwood  Project outline: Intraosseous Transcutaneous Amputation Prostheses (ITAPs) provide patients with sensory feedback through osseoperception. However, ITAP users still lack the senses of proprioception and touch through their prosthetic limb. ITAP provides a unique opportunity to provide direct sensory feeback: by sending vibrotactile signals along the device to the patient. This project will investigate the transmission of vibrations from an external prosthesis to the patient through an ITAP device.  We hypothesise that ITAP can be used for transmission of vibrotactile feedback, but little is understood about the consequence of vibrations on both the skin-implant and bone-implant interfaces. To ensure the safety of vibrotactile feedback, and to demonstrate the feasibility of this approach, we must understand the force transmission through the bone-anchored interface.   The student will further develop an existing model of force transmission through ITAP using finite element modelling. The tasks on the project are as follows:  1) To develop a model of ITAP in press-fit and cemented fixation within a long bone, and to predict vibrotactile force transmission using this model.  2) To extend the initial model using a simplified anisotropic bone model, and to predict vibrotactile force transmission using this model.  3) To develop a clinically relevant ITAP-bone model using clinical scans of bone remodelling to predict vibrotactile force transmission.  This research project will provide key knowledge of vibration amplitudes at the skin-implant and bone-implant interfaces. This model will then be validated in a physical system (outside this proposal) and the knowledge gained will be used to define the forces and frequencies used in a patient study of vibrotactile sensory perception using ITAP. The project is a collaboration between the Department of Medical Physics and Biomedical Engineering, the Department of Orthopaedics and Musculoskeletal Science, and the Royal National Orthopaedic Hospital, Stanmore.  Week 1: Literature review/background work. Week 2-3: Learning and training in finite element modelling. Week 4-5: Modelling linear perturbations and attachment to isotropic bone. Week 6-7: Modelling perturbations with complex, anisotropic, bone models. Week 8: Writing up a report.  Outputs: A written report summarising the work completed. A detailed model of an ITAP device in situ for application of vibrotactile forces. Contribution towards future research design into vibrotactile sensation and prostheses. Contribution towards conference abstract / presentation or peer reviewed journal publication. Contribution to continued collaboration between UCL and RNOHT staff developing future funding and studentship applications.   Skills and clinical observation opportunities students will gain from this project: Skills:  Finite Element Method Modelling;  Computer Aided Design;  Research Question Development;  Understanding of surgical techniques involved in distal femoral/proximal tibial replacement, and techniques used surgically when replacing large segments of bone with massive endoprostheses; Understanding and developing knowledge of gait laboratory techniques used to assess post-operative function following distal femoral/proximal tibial replacement.  Clinical observation: 1) a visit to the RNOH gait lab to observe amputees’ taking part in gait analysis and/or 2) attendance at an operation to observe long bone implantation techniques.   UCL staff involved on the project: Dr Henry Lancashire, Department of Medical Physics and Biomedical Engineering. Dr Catherine Pendegrass, Department of Orthopaedics and Musculoskeletal Science.  Pre-existing skills needed for this project: Some experience with CAD and finite element modelling. |
| 7 | Project title: Using Cardio-Pulmonary Exercise Test (CPET) to predict post-surgery outcomes  Clinical unit: UCLH - HPPL Human Pharmacology and Physiology Laboratory  Lead clinicians: Dr John Whittle, Consultant in Anaesthesia, Critical Care + Perioperative Medicine  Project outline: From a joint collaboration between the UCLH perioperative unit and the WEISS Centre, we propose a project that will aim to create the foundation for a machine learning approach to determine the odds of developing complications after surgery and finally predict the long term mortality.  A surgical operation represents an enormous physical and mental challenge for humans, like a strenuous run or hiking, with a complex impact on the quality and quantity of life during and after the surgery.  Every year more than 350 Million surgery operations are conducted around the world, and future predictions show a potential increase up to 500 million/years by 2050. Concurrently, the human population is globally getting older and the amount of people with relevant medical conditions (Arterial hypertension, Diabetes, Obesity, etc.) is increasing. Thus a population that is getting every day more complex leads to a higher risk of developing complications and adverse outcomes from surgery.  Nowadays, the main clinical approach is the clinical use of the Enhanced recovery after surgery (ERAS) protocols. The ERAS are multimodal perioperative care pathways designed to achieve early recovery after surgical procedures by maintaining preoperative organ function and reducing the profound stress response following surgery. But despite this innovative approach, 1 in 5 patients develops serious perioperative complications.  Currently, anaesthetists and clinicians are not able to predict in advance the development of these complications and clinical scores lack the ability to stratify the patients before the surgery. But, again, technology is on our side. We can currently use the cardio-pulmonary exercise test (CPET) to obtain an enormous amount of extremely interesting data from patients at rest and under stress, mimicking the surgical stress and recording their physiological responses. This response to stress is strictly correlated with the development of future complications after surgery.  Furthermore, these data minutely describe how our cardiovascular system and our metabolism adapt to physical stress, but its analysis is complex and is it not possible to be done in real-time by humans, but could be done using a multimodal machine learning approach.  Whit a machine-based approach we aim to be able to understand to describe the different phenotypes of human physiology and their correlation with surgical stress and perioperative outcome. Finally, the aim of this project is to develop the first fundamental steps of a future clinical tool to help clinicians to better understand the risk for patients undergoing surgery, creating the base for future medical interventions. The project will be developed over two months, with the first 4 weeks phase of clinical introduction and development of the database and a second 4 weeks phase of creating the model with the support and the assistance of clinicians and engineers lead.    Outputs: The future of medicine is based on a multidisciplinary approach. With this idea in mind, this project has been developed by a heterogenous group, constituted of anaesthetists, clinical physiologists and engineers. Thus, the first and main outcome of this project is to create the future generation of engineers/doctors. The project will be developed in a complex and stimulating environment for the student, who will benefit from the multiple input from different professionals. Finally, the student will learn the challenge of approaching a complex problem with a multimodal response.  The medical output is complex and variegate. The first aim will be to create a prototypal machine learning-based model to analyze the dataset which will be further developed in the future. This will provide an initial validation of this model with this type of dataset. Moreover, the student will learn the function and structure of the perioperative clinics, and he will learn the rudiments of patients interactions, observing our clinicians on a daily base job. This would provide the next generation of students with the ability to understand everyday clinical challenges.  The engineering output will be firstly focalized on developing and refinishing a complex database, constituted of 10 years of data of CPET patients. This will permit to optimize of the retrospective data and focalize the prospective new data acquisition for the ongoing studies. Moreover, with the technical lead at the WEISS Centre, the student will be able to study and learn the most advanced techniques of Machine learning applied to medical data.  Finally, the student will be involved in the scientific process around the study of human physiology and its implementation in a complex model, and he/she will be inserted as an author in any scientific output will be produced from this collaboration.   Skills and clinical observation opportunities students will gain from this project: The student will be able to join the CPET service and be part of the outpatient admission and study. The CPET service will run every morning during the weekdays, collecting the data of multiple patients every day. Thus, the student will be able to discover and understand how the medical visit is conducted, from the collection and revision of the past medical history, up to the CPET exam. This is a fantastic opportunity to develop interaction skills and to understand how clinicians could benefit from the technological implementation. Moreover, during each session, the student will learn from an expert how echocardiography is conducted, besides the CPET analysis. Finally, the student will be able to analyze the CPET data with experts to understand how to develop the model.   UCL staff involved on the project: Dr. Pietro Arina, UCL, Division of Medicine Dr John Whittle, UCL, Division of Medicine  Dr Mazomenos, Evangelos, Dept of Med Phys & Biomedical Eng   Pre-existing skills needed for this project: The project is ideal for students with experience in programming (Python) and machine learning development. However, the only pre-existing skills are a strong mathematical background on statistics and probabilities. |
| 8 | Project title: Kinesiophobia: a systematic review and patient impact interview  Clinical unit: RNOH - Physiotherapy  Lead clinicians: Mr Anju Jaggi  Project outline: Kinesiophobia, or the fear of movement, is an important aspect of many musculoskeletal disease processes and in the recovery from musculoskeletal surgery. Kinesiophobia can impair function, hinder health maintenance, reduce recovery speed and result, and decrease patient care satisfaction (1-3).   This project will carry out a systematic review on the measurement and treatment of kinesiophobia. The systematic review will: 1. Establish which clinical populations are affected by kinesiophobia, 2. Determine how kinesiophobia clinically presents, 3. Identify how kinesiophobia is diagnosed and measured,  4. Capture additional case details such as reported comorbidities,treatment,and outcomes.  Following PROSPERO guidelines the student will prepare a protocol for the systematic review, followed by conducting the review with the support of their supervisors.   The study will draw on the outcomes of the review to inform a second phase of the research; identifying how patients, families, and carers conceptualise and are impacted by kinesiophobia through a Patient and Public Involvement (PPI) study. The student will recruit patients with kinesiophobia at the Royal National Orthopaedic Hospital (RNOH), via telephone, email or video calling to fill out a questionnaire. The questionnaire will capture how patients’ daily activities are affected by kinesiophobia, things they find difficult during treatment, and patient-led discussions of perceived service improvements (e.g. different types/frequency of treatment, mental health support). Quantitative and qualitative analysis of patient responses will be compiled under direction of the project supervisors and reported to the wider research community at the RNOH.  This research will inform the development of future clinical, social and economic research. There are additional opportunities for the student to carry out stakeholder mapping and project development, depending on their interests and subject to ethical approval.  The student will benefit from two weeks observing consultations in the physiotherapy department, clinical research undertaken at UCL Aspire CREATe laboratory, clinical motion capture data collection at the Motor Learning Laboratory and patient clinics with Consultant Surgeons. Additional days of clinical experience will be incorporated into the timetable during the research weeks in order to train in and carry out the PPI, and depending on student interest.  Proposed project timeline Week 1: Clinical experience + PPI Week 2-3: Systematic review protocol Week 4: Clinical experience + PPI Week 5-7: Systematic review Week 8: Write-up, hand-over and dissemination  References Perrot S, Trouvin AP, Rondeau V, et al. Kinesiophobia and physical therapy-related pain in musculoskeletal pain: a national multicenter cohort study on patients and their general physicians. Joint Bone Spine. 2018;85:101–107. Ardern CL. Anterior cruciate ligament reconstruction-not exactly a one-way ticket back to the preinjury level: a review of contextual factors affecting return to sport after surgery. Sports Health. May 2015;7:224–230. Lentz TA, Sutton Z, Greenberg S, Bishop MD. Pain-related fear contributes to self-reported disability in patients with foot and ankle pathology. Arch Phys Med Rehabil. 2010;91:557–561  Outputs: The main student output would be a systematic review protocol (submitted to a journal during the studentship with full support of the research team), a draft of the systematic review itself (which the student can choose to continue to be involved in up to and including publication in a journal) and a PPI report. Due to the multidisciplinary nature of this project, the resulting systematic review is likely to contribute to several far-reaching projects such as clinical, health and medical anthropological research. The PPI report will form the basis of future research and grant applications to develop study themes further.  Skills and clinical observation opportunities students will gain from this project: Conducting a systematic review, qualitative and quantitative research design, data collection, and analyses, working within a multidisciplinary team, observing multiple aspects of treatment of patients in a tertiary orthopaedic hospital (e.g. physiotherapy clinics, gait analysis, surgical consultations), observing how UCL and the RNOH collaborate on clinical research, Patient and Public Involvement research, consideration of stakeholders in research, maximising research impact.  UCL staff involved on the project: Ms Fraje Watson, Division of Surgery & Interventional Science. Dr Alex Tasker, UCL Anthropology. Ms Catherine Borra, Social Research Institute.  Pre-existing skills needed for this project: None |
| 9 | Project title: Endoscopic spinal surgery - AR application  Clinical unit: RNOH -Spinal Surgery Unit  Lead clinicians: Mr David Baxter  Project outline: Supporting a broader project looking at use of AR in surgical training, looking specifically at endoscopic spinal operations, supporting analysis of data and supporting development of next potential steps. Initial component will be observing surgical intervention to understand the application of AR before learning and helping to analysed obtained data from the system.  Outputs: Supporting analysis of data, supporting development of next steps and involvement in developing ideas for future application.  Skills and clinical observation opportunities students will gain from this project: Observe in clinical settings, both outpatients and operating theatres during spinal surgery.  UCL staff involved on the project: Professor Rui Louireiro  Pre-existing skills needed for this project: Some understanding of AR, coding, and data analysis. |
| 10 | Project title: Spinal Sarcoma Priority setting partnership.  Clinical unit: RNOH- Spinal surgery unit  Lead clinicians: Hanny Anwar, David Baxter  Project outline: Sarcomas are a rare group of heterogeneous cancers that arise from mesenchymal cells and can arise in any part of the body, including bone, tendons, blood vessels and fatty tissues, making them prone to late diagnosis. In other malignancies, early diagnosis has an impact on the stage of disease complexity of therapeutic procedures, survival, and health-related quality of life (HRQoL). Over 5000 patients are diagnosed with Sarcoma in England each year; this equates to 15 per day. Over 600 of these cancers arise in bone; one-tenth of these, equalling around 60 patients annually, occur in the spine.  Early diagnosis, complete surgical excision and oncological treatment can cure. However, compared with boney sarcomas that arise in the extremities, such as the arms and legs, spinal sarcomas have a relatively poor prognosis; the reason for this difference is unclear. There is no known difference in the biological aggressiveness of sarcomas of the spine compared to extremity sarcomas. Spinal sarcomas are often smaller on presentation in tumour volume than extremity sarcomas because of the relatively early onset of neurological symptoms. The National Institute for Health and Care Excellence (NICE) recommends the referral of anybody with sarcoma to a specialist sarcoma team for diagnosis and treatment. There are five centres in England and Wales; these are in Newcastle, Manchester, Newcastle, Birmingham, and the Royal National Orthopaedic Hospital (RNOH) in London.  In the past, clinicians and researchers set research priorities without fully considering patients and their carers' needs. The pharmaceutical and medical technology industries and academia play essential roles in developing and testing new treatments. Still, their priorities are not necessarily the same as those of patients and clinicians. On occasion, this has led to inefficient use of resources as well as harm to patients.   In part, because of work by the James Lind Alliance and the National Institute for Health Research (NIHR), patients and the public expect that researchers and health professionals will carry out systematic reviews before setting research strategies. This process ensures that questions about whether a treatment causes harm and whether one treatment is superior to another have been answered. This process also helps to organise research programs that address the most urgent of these unanswered questions.  The JLA has developed a methodology that we will utilise in this Spinal Sarcoma PSP to ensure that in the future, researchers focus on essential areas of research and there is an alignment of the research strategies and the needs of patients and clinicians.  The spinal sarcoma PSP started at the end of 2021, partnered with each of the five national centres in the UK as well as the main charities that support the condition (Sarcoma UK and the Skeletal Cancer Trust). The successful IHE student will join the existing team, specifically to support the information specialist with: 1. Gathering the uncertainties. 2. Data processing and verifying uncertainties and, 3. Interim Priority setting. They will be given clear direction, formal training, and support to carry out literature reviews as well as to write a scientific publication and develop web and social media content.   Outputs: One poster at a National meeting. One publication in a peer reviewed journal. Literature review skills. Scientific writing skills. Web and social media management skills.   Skills and clinical observation opportunities students will gain from this project: Students will be expected to attend training in how to select journals for publication as well as how to write medical papers. Students will be expected to observe complex spinal sarcoma surgery, attend sarcoma MDTs, and speak with patients and the people that care for them (under supervision).  UCL staff involved on the project: NA  Pre-existing skills needed for this project: Organised, driven individuals interested in wider aspect of innovation that reflects the needs of those for whom innovation and treatment is intended for. A good opportunity for a student who wishes to gain more insight into patient and public involvement in order to design and develop interventions, which are addressing real patient needs. |
| 11 | Project title: Evaluation of the Role of PET Imaging for Target definition in Radiotherapy for Rectal Cancer   Clinical unit: UCLH - Oncology: Gastrointestinal Clinical Oncology  Lead clinicians: Prof Maria A. Hawkins; Dr Thomas Richards, Consultant Clinical Oncologist; Dr Douglas Brand, NIHR fellow.  Project outline: Radiotherapy is administered to patients with locally advanced rectal cancer to optimise their chance of subsequent successful surgery. Definition of the target (cancer) and the normal organs is crucial to treatment planning, so that radiotherapy dose is delivered appropriately. In the UK generally, the imaging utilised for radiotherapy treatment planning is a computerised tomography (CT) scan. At UCLH we have been planning patients utilising positron emission tomography (PET)-CT, which additionally provides metabolic imaging information. This is useful, since cancer cells are more metabolically active than most normal tissue, making their position much clearer in some cases. This dataset provides an excellent opportunity to examine the influence of additional metabolic information in subsequent delineation of the cancer target. The standard uptake value (SUV) for the PET images can be examined, with thresholding methods used to examine influence on tumour target size definition. It would also be possible to examine whether current commonly used methods for the target definition, which include unaffected rectum, might be replaced with a PET defined alternative. For interested students, it would be encouraged to consider the development of automated methods to incorporate the PET information into treatment planning, including deep learning. The exact methods used can be matched to the student’s experience level with data analysis.  Weeks 1-2 = Clinical observation. Outpatients, radiotherapy planning (all stages). Learning about the use of electronic health records and radiotherapy treatment planning systems. Development of initial database of patients. Weeks 3-4 = Further clinical observation possible depending on interest. Development of systematic review of current literature (to form basis of future publications). Development of patient characteristic database. Weeks 5-8 = Development of models to examine influence of PET imaging on cancer target definition, as outlined above. Additional clinical days can be arranged ad-hoc if strongly desired. Some write up of results should occur before end of placement, ideally to abstract format.  Outputs: Completion of a service evaluation; Present findings as a conference abstract; Write up findings into a full-length research paper or letter.  Skills and clinical observation opportunities students will gain from this project: Understanding of clinical activities involved in cancer treatment pathways; Familiarity with medical imaging types in common use, particularly in a radiotherapy context; Radiotherapy plan interpretation and analysis; Data analysis and statistics skills; Data presentation skills.  UCL staff involved on the project: NA  Pre-existing skills needed for this project: Some understanding of medical imaging types and data analysis would be helpful but not essential. |