2021 MPhil Vignettes in Women’s and Children’s Health

- Below is a list of 43 exciting projects currently being offered as MPhil studentships in WCH starting September 2021.

- For more information about the projects, please contact the relevant supervisor by email.

- If you have any questions about the process, please contact Prof Paul McNamara (mcnamp@liverpool.ac.uk).

- Please apply by 5pm on 29th January 2021 by sending a short CV and covering letter outlining your strengths and reasons for applying to Kim Hall (kjhall@liverpool.ac.uk).

- Please clearly indicate the numbers/letters of the top three projects you’re interested in.
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Child Health

1) Paediatric Clinical Pharmacology

Paediatric Pharmacology themed MPhils have been very successful in the last 5 years, with all students achieving peer reviewed publications of their work.

a. Optimizing Asthma medication (Hawcutt/Sinha)

Up to one in eleven children in the UK is diagnosed with asthma at some point in their childhood. This involves prescription of medications, and regular reviews at primary or secondary care. The advice in international guidelines is to only use the lowest required amount of therapy, to ensure that children and young people are not exposed to unnecessary medicines and the risk of adverse drug reactions.

This MPhil will address the question of when is the right time to “step down”, developing evidence based guidelines in this area. The student will be based with the Pharmacology and Respiratory teams within Alder Hey, with clinical work aligned with the asthma service.

Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) for more information

b. Better, safer medicines in Paediatric Palliative Care (Hawcutt/Gates)

Paediatric Palliative care involves looking after some of the most complex and challenging situations in childhood, and there are many issues with medications that are experienced by the children and their families. This MPhil programme will explore the prescribing and deprescribing that occurs in a paediatric palliative care population, working towards the development of evidence based guidelines.

The successful student will be based between Alder Hey (Paediatric Pharmacology) and Clare House (Palliative Care), with ward round and patient contact, building on the established links between the two services.

Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) for more information

c. Systematic review of ADHD medications used in the patients with head injury (Hawcutt/Kumar)

There is emerging evidence about the use of methylphenidate (and other ADHD medications) in the treatment of children (and adults) who have suffered a head injury. We are working up a study in this area, but the first step is to establish the current evidence base. We are therefore looking to get systematic reviews of the literature done to look at the potential benefits and harms for this treatment. The MPhil will also contain some prospective data collection from families and patients with brain injury to establish the acceptability of these new treatments, and to help design the potential future studies.

The successful candidate would get clinical experience in the neurology team as well as pharmacology, all based at Alder Hey Children’s Hospital.

Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) for more information
d. Improving the care of children and young people with Type 1 diabetes (Hawcutt/Deakin)

This MPhil is now recruiting for the third consecutive year. The previous students have excelled, improving our understanding of adherence to insulin in this population, and the factors that affect presentation at time of diagnosis. The MPhil will continue to build on this work, recruiting patients and families to research studies examining how to optimise their therapy and minimise their adverse events.

The student will be based with the Pharmacology team, and the Diabetes team (both in Alder Hey Children’s Hospital), with clinical experience in the wards and outpatients of diabetes diagnosis and management.

Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) for more information

e. Re-purposing medicines to improve care in Duchenne Muscular Dystrophy (Hawcutt/Spinty)

This MPhil will undertake systematic reviews of the evidence supporting re-purposing of existing medicines to improve care of boys with DMD. This will include agents that could manage appetite, and alternate methods of delivering medications.

The successful student will be based with the pharmacology team, and the Neuromuscular team, at Alder Hey children’s hospital, with clinical experience and exposure in both of these areas.

Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) for more information

f. Are all children equal when it comes to clinical research? (Blair/Hawcutt)

Participation in clinical research is known to improve health outcomes. Ideally, access to clinical research would be equitable for all patients. However, there is evidence from adult clinical trials that some patient groups are under-represented in study populations. This is a concern for two reasons: (1) the outcomes of studies performed in a selected population of patients may not be generalizable to the population of patients to whom the results would be applied and (2) in our society there is a belief that access to health opportunities should be equally available to all.

The successful student will analyse data from clinical studies performed at Alder Hey over the last five years to determine whether the population of patients we recruit is representative of the population of patients we treat in any disease area. This important research project will help us to understand where barriers to participation might be, and how we might start to address them.

The successful student will develop new skills in data analysis, critical thinking, systematic reviews and will present their findings at national meetings and in peer reviewed publications. They will have an opportunity to work with clinicians recruiting patients to clinical studies, and the families and patients that participate.
g. **Drug-induced kidney injury (McWilliam/Wright)**

Drug-induced kidney injury is an important cause of acute kidney injury (AKI) in children. Many drugs result in nephrotoxicity but the mechanisms vary, and are incompletely understood. This probably also means that a variety of different approaches are needed to prevent this toxicity from occurring. This project will focus on a specific drug, to be chosen when the student starts, and will include:

3. Using a kidney cell model called conditionally immortalised proximal tubule epithelial cells in the lab to investigate the mechanisms of toxicity of the specific drug.

We anticipate this work will lead to presentations at national conferences and submission for publication. This work will contribute to an ongoing quality improvement project which will reduce this preventable cause of morbidity and mortality for children at Alder Hey and beyond.

For more information, please contact Dr Steve McWilliam, NIHR Academic Clinical Lecturer in Paediatric Clinical Pharmacology: stevemcw@liverpool.ac.uk

h. **Preventing adverse drug reactions in children in hospital (Bracken/Hawcutt/Peak/Gill)**

Medicines play a vital part in treating and preventing disease in adults and children. The aim is always to develop medicines that have no side effects (or adverse drug reactions) but the reality is that all medicines can potentially cause unwanted effects in some people. Medicines affect people differently, especially children; due to the changes that take place as they grow and develop. We previously carried out a study at Alder Hey which found that about 1 in 6 children experienced an adverse drug reaction (ADR) while in hospital. Many of these were straight after surgery. Although not medically serious, some reactions caused discomfort to the child and required extra treatment. Some of these could have potentially been avoided, for example by giving a different medicine or prescribing another medicine alongside the treatment.

In this study, we will work with pharmacists, doctors and nurses to discuss the potentially avoidable ADRs and how we might develop interventions to consistently reduce the chances of them occurring. First we will measure how often avoidable ADRs happen. Then we will introduce the intervention and determine whether or not fewer reactions occur. We are also interested in the impact of ADRs. We will measure this by collecting information about what happened as a result of the ADR; for example, did the child need extra medicines? Did they need to stay in hospital longer?

The successful student will be supported within the multi-disciplinary Paediatric Medicines Research Unit based at Alder Hey [https://alderhey.nhs.uk/healthier-future/research/paediatric-medicines-](https://alderhey.nhs.uk/healthier-future/research/paediatric-medicines-).
research-unit. This is an excellent opportunity to develop new skills in data collection and analysis, critical thinking and will present their findings at national meetings and in peer reviewed publications. They will have an opportunity to work with clinicians recruiting patients to the study, and the families and patients that participate.

Contact details: Dr Louise Bracken (Louise.Bracken@alderhey.nhs.uk)

2) Paediatric Surgery

a. Regenerative medicine therapies in acute kidney injury (Kenny)
Acute kidney injury is a leading cause of morbidity and mortality following trauma, sepsis and surgery. This is an opportunity to undertake a project within an innovative and motivated team combining interests in cell biology, immunology and kidney disease in a multi-disciplinary team of surgeons and basic scientists.

We are investigating the effects of stem cell therapy in acute kidney injury, with a view to finding a therapy that will be translated into safe clinical use.

You will have the opportunity to be involved in a focussed research project which combines the use of novel imaging techniques for cell tracking with laboratory based analysis of the immune modulation that occurs with stem cell therapy. The focus of the project will include:

- Literature review regarding the immune function of the lungs after stem cell therapy.
- Laboratory analysis of lung tissue following stem cell delivery to examine for stem cell distribution, cell apoptosis and macrophage engagement.
- Correlation between the above findings and bioluminescence imaging to increase our understanding of the fate of stem cells after acute kidney injury.

You will work closely with a surgeon currently undertaking a PhD and you will be supported in learning a variety of lab-based techniques. Successful candidates will be to present their work at international conferences and publish in peer reviewed journals.

Contact Simon Kenny (simon.kenny@alderhey.nhs.uk) for more information

b. Use of stem cells in treatment of Hirschsprungs disease (Kenny)
At the University of Liverpool and Alder Hey we have been world leaders in the identification and isolation of neural progenitor cells that are the source of the enteric nervous system. These cells have the potential to provide a non-surgical treatment for children born with Hirschsprungs disease. You will be part of a interdisciplinary team and gain experience in literature review and critical thinking, experimental design, cell culture, immunohistochemistry, PCR, sequencing, and RNA analysis. Successful candidates will be to present their work at international conferences and publish in peer reviewed journals.

Contact Simon Kenny (simon.kenny@alderhey.nhs.uk) for more information
c. Towards improving survival in childhood neuroblastoma - experimental models to study and treat childhood cancer (Losty)

The MPhil student will join a highly successful award winning multidisciplinary team of paediatric surgeons, medical oncologists and scientists deploying experimental neuroblastoma model systems to seek new and better therapies for childhood cancer. The student will acquire training in developmental biology and state of the art cancer research lab skills.

Contact Prof Paul Losty (pdisty21@liverpool.ac.uk) for more information

d. Exploring the short and long-term complications of congenital diaphragmatic hernia (Losty/Sinha)

Congenital Diaphragmatic Hernia (CDH) is a common congenital malformation leading to significant mortality in the antenatal and neonatal period. There are many unknowns in the field of CDH, and at Alder Hey Children's Hospital we are conducting various types of research to address this. This MPhil will be very clinical in nature. You will conduct clinical and epidemiological research around short and long term complications of CDH - from the perspective of infants and children, and their families. In order to do this, you will attend our joint surgical/respiratory multispecialty clinic, which is one of the leading services of its type in Europe. You will develop skills in systematic reviewing, database research, and understanding lung function tests and chest x-rays. We anticipate at least three publications from your work, and at least one attendance at an international conference to present your findings.

Contact Prof Paul Losty (pdisty21@liverpool.ac.uk) for more information
3) Paediatric Rheumatology and Renal Medicine

a. IgA Vasculitis nephritis (Oni/Wright)
Immunoglobulin A vasculitis (IgAV) is the most common form of vasculitis in children (20/100,000 children per year) caused by deposition of aberrantly glycosylated IgA in tissues leading to activation of an immune response (1). IgAV is usually self-limiting and the majority of children have a full recovery with no intervention. However, 30-50% of patients with IgAV will go on to develop renal inflammation, nephritis (IgAVN), and 10-20% of these will progress to chronic kidney disease (2, 3). There is currently no way to identify which patients will develop nephritis and all complete a 6-month renal monitoring period (4). This exciting project will focus on early clinical and/or laboratory biomarkers as part of ‘The IgA vasculitis study’, to predict which patients are likely to develop renal involvement to enable personalised monitoring. The student will gain experience working in a translational clinical academic laboratory group to gain research skills.

The Paediatric Renal MPhil program is well established, and supervision will be supportive to provide completion of the thesis, additional publications and attendance at relevant conferences. This will provide the appropriate FPAS points on the job application for Foundation posts.

Contact Louise Oni (louise.oni@liverpool.ac.uk) for more information

b. Acute tubulointerstitial nephritis (Oni/Holt)
Acute tubulointerstitial nephritis (TIN) is a rare renal disorder in children. It often presents with non-specific symptoms and signs and varying degrees of renal inflammation. It may be secondary to infection, drugs or an autoimmune process. Often the cause is not found. Some children will get uveitis associated with acute TIN called TINU. This exciting project will begin to explore the evidence to support the use of immunosuppressant treatment in this disease and develop a prospective surveillance study to gather further information.

The Paediatric Renal MPhil program is well established, and supervision will be supportive to provide completion of the thesis, additional publications and attendance at relevant conferences. This will provide the appropriate FPAS points on the job application for Foundation posts.

Contact Louise Oni (louise.oni@liverpool.ac.uk) for more information

c. The molecular pathophysiology of Chronic Nonbacterial Osteomyelitis (Hedrich/Charras)
Chronic non-bacterial osteomyelitis (CNO) is an auto-inflammatory bone disorder that primarily affects children and adolescents. The clinical spectrum is variable and ranges from single asymptomatic bone lesions at the one end to the most severe form referred to as chronic recurrent multifocal osteomyelitis (CRMO) at the other end. Due to its variable clinical presentation, diagnosis is frequently delayed or even missed. This is particularly worrying, since untreated CNO may result in bone sclerosis, pathological fractures (mainly of the vertebral bodies) sometimes with subsequent neurological symptoms, growth anomalies, pain amplification, and psychosocial problems. Thus, CNO/CRMO can significantly influence the development and quality of life in affected individuals.
Recent discoveries contributed to a better understanding of underlying molecular mechanism leading to systemic inflammation in CNO. However, the exact molecular pathophysiology remains incompletely understood. To our current understanding, several molecular disturbances contribute to the molecular pathophysiology of CNO. Bone inflammation may be the result of dysbalanced cytokine expression (namely reduced expression of the immune regulatory cytokine IL-10, and increased expression of pro-inflammatory IL-1beta, IL-6, and TNF-alpha) from innate immune cells and subsequent osteoclast differentiation and activation, resulting in bone remodeling and inflammatory bone loss.

Our group has identified several molecular mechanisms contributing to cytokine dysregulation and pro-inflammatory immune cell phenotypes in CNO/CRMO. Most recently, we recently identified mutations in a gene closely linked with the regulation of inflammation in innate immune cells. Mutations were present in several families with a history of CNO that may explain cytokine dysregulation and bone inflammation.

This project will aim to investigate molecular defects contributing to/causing imbalanced cytokine expression in the pathophysiology of CNO/CRMO by:

- Characterizing genetically modified monocytic cell lines (THP-1 cells) that are deficient of the gene we recently linked with the pathogenesis of CNO/CRMO and testing their capacity to produce inflammatory cytokines and differentiate into macrophages or osteoclasts.
- Introducing disease-associated mutations into the afore mentioned system to investigate their molecular impact on cytokine expression and cell characteristics.
- Testing available molecular interventions (cytokine blockade, small molecules, etc.) to correct the molecular phenotype of cells carrying CNO-associated mutations in the cell culture system to generate evidence for future applications in patients.

The project will be integrated into an already established translational programme of research within the University of Liverpool. The successful candidate will join a multi-disciplinary Paediatric Rheumatology Research team that are based in the Institute of Child Health at Alder Hey which is the only Centre of Excellence for Childhood Lupus and is the UK’s first and only “Experimental Arthritis Treatment Centre for Children” (EATC).

The candidate will work with genetically modified cell lines (THP-1 cells). This guarantees availability of cells in relatively large quantities at all times. The candidate may also be involved in the recruitment and collection of fresh samples. After this project, the candidate will be proficient in ex vivo isolation of immune cells, differentiation of monocytic cells into macrophages or osteoclasts, basic cell culture techniques, flow cytometry, ELISA and qRT-PCR. The candidate will have a basic understanding of methods available to genetically modify cells and tissues to model disease.

Contact Prof Christian Hedrich (chedrich@liverpool.ac.uk) for more information.

d. The molecular pathophysiology of psoriatic juvenile idiopathic arthritis (Hedrich/Carlsson)

In the absence of biomarkers, it can be difficult to diagnose psoriatic arthritis (PsA) in early stages. Indeed, in up to 50% of patients, arthritis precedes skin changes, thus mimicking other forms of
arthritis. Childhood disease (psoriatic juvenile idiopathic arthritis; PsJIA) presents with particularly severe phenotypes in the absence of comorbidity (generating “immunological background noise”) underscoring both the benefit and need for research in this age group.

The underlying hypothesis for this project is that numeric expansion and activation of innate and adaptive immune cell subsets in PsJIA reflects disease- and outcome-specific events that contribute to inflammation and damage. Defining disease-specific cellular and molecular alterations will aid in diagnosing patients at an early stage, deliver prognostic biomarkers, and new therapeutic targets.

In this pilot project, we will ask whether immune cell subpopulations represent:

i) aberrantly activated (“disease-specific”) effector cells (monocytes, DCs, T cells, etc.), or

ii) physiologically occurring immune cells that are expanded in numbers.

Findings from this study will provide detailed information on the composition and activation of immune cell subsets in health and disease (PsJIA). It will be the foundation for future research into disease (psoriasis vs PsJIA) and tissue (blood vs synovial fluid) specific molecular alterations to allow patient stratification and personalized treatment.

Single cell ATAC sequencing will allow epigenetic profiling of small cell numbers, including rare immune cell subsets in bodily fluids (blood and synovial fluids) of patients with PsJIA and controls. Single cell data generated from PBMCs from healthy matched controls (N=4) will be compared to PBMCs from patients with PsJIA and immune cells from synovial fluid of the same patients (N=3 each).

As overall cell numbers available from synovial fluid (but in children also blood) are limited and include rare cell subsets that may centrally contribute to disease pathogenesis and phenotypes, single cell ATAC sequencing is the method of choice to generate reliable and biologically meaningful epigenetic datasets. Single cell technology will allow cell type identification and comparison of epigenetic patterns between controls vs patients, and between sample sources/tissues (blood vs synovial fluid). Additional cells collected from the same patients at the same time will be used towards RNA expression profiling using single-cell RNA sequencing (10X platform) in future projects.

The project will be integrated into an already established translational programme of research within the University of Liverpool. The successful candidate will join a multi-disciplinary Paediatric Rheumatology Research team that are based in the Institute of Child Health at Alder Hey which is the only Centre of Excellence for Childhood Lupus and is the UK’s first and only “Experimental Arthritis Treatment Centre for Children” (EATC).

Contact Prof Christian Hedrich (chedrich@liverpool.ac.uk) for more information.

e. Single cell immune phenotyping in psoriatic juvenile idiopathic arthritis (Hedrich/Serafim de Carvalho Kok)

Juvenile psoriasis (JPs) and juvenile psoriatic arthritis (JPsA) lead to approximately one third of all cases of adult psoriasis. Psoriasis imposes a significant burden to quality-of-life and mental wellbeing of children and adults affected. The incidence of childhood psoriasis has more than doubled over the
past 50 years and represents a major clinical burden for the NHS. Despite this, juvenile psoriasis remains largely unstudied and almost no basic laboratory data exists on cytokine dysregulation and immune cell biology. The consequence of this paucity of data is that diagnosis and treatment of psoriasis and psJIA can be challenging: ~50% of psJIA patients initially do not exhibit skin lesions and may be misclassified as another subtype of JIA. This can lead to exacerbation of disease because first-line treatments for other.

Understanding the immune mechanisms responsible for initiation and maintenance and remission stages of disease is crucial to diagnose patients earlier, measure disease activity, predict disease courses, and provide new targets in the search for individualised, disease stage and subtype specific therapies.

This project will focus on investigating and defining the composition and molecular phenotype of immune cells in blood and synovium fluid samples from JPs and JPsA (healthy controls and other forms of JIA)

The specific aims of these project are:

i) Characterisation of innate (monocytes, pDCs) and adaptive (T cells) immune cells from psoriasis and psJIA patients vs. controls (other JIA subtypes, healthy) using CyTOF technology;

ii) Investigation of cytokine expression and release from ex vivo isolated innate (pDCs, monocytes) and adaptive (T cells) immune cells using Proximity Ligand Assay for Rna, (PLAYR)

The project will be integrated into an already established translational program of research within the University of Liverpool. The successful candidate will join a multi-disciplinary Paediatric Rheumatology Research team that are based in the Institute of Child Health at Alder Hey which is the only Centre of Excellence for Childhood Lupus and is the UK’s first and only “Experimental Arthritis Treatment Centre for Children” (EATC).

The candidate will work with blood and synovium fluid samples, and may also be involved in the recruitment and collection of fresh samples. After this project, the candidate will be proficient in ex vivo isolation of immune cells, differentiation of monocytic cells into macrophages or osteoclasts, basic cell culture techniques, flow cytometry, ELISA as well as CyTOF and PLAYR assays.

Contact Prof Christian Hedrich (chedrich@liverpool.ac.uk) for more information.

f. Outcomes and follow-up of acute kidney injury in children
(McWilliam)

There is data demonstrating that children who experience acute kidney injury (AKI) have significantly increased morbidity and mortality. In the short-term this is reflected in increased length of hospitalisation and in hospital mortality. In the long-term this is reflected in an increased incidence of chronic kidney disease. The outcomes may vary depending on the initial cause and severity of the AKI.
This project will include:

1. Systematic review of literature on short- and long-term outcomes of AKI in children
2. Analysis of Alder Hey electronic medical record data to describe short-term outcomes of AKI
3. Review of data from patients in the Alder Hey AKI follow-up clinic to assess longer-term outcomes

We anticipate this work will lead to presentations at national conferences and submission for publication. This work will contribute to an ongoing quality improvement project which will reduce this preventable cause of morbidity and mortality for children at Alder Hey and beyond.

For more information, please contact Dr Steve McWilliam, NIHR Academic Clinical Lecturer in Paediatric Clinical Pharmacology: stevemcw@liverpool.ac.uk

g. In children with recurrent mouth ulcers, what are the risks of developing a systemic inflammatory condition such as Lupus, Behcet’s disease or inflammatory bowel disease? (Pain/Beresford)

This project will seek to understand the risk of developing a serious systemic inflammatory condition in children who present with recurrent mouth ulcers.

Recurrent mouth ulcers can affect up to 20% of all children and in most cases are benign and self-limiting. However, they can be the presenting symptom of significant illness such as Lupus, Behcet’s disease, inflammatory bowel disease or vasculitis. There have been no prospective studies to examine how many children with mouth ulcers go on to develop these conditions. There may be clues in presentation which put children at more risk of developing a serious condition.

The CPRD (Clinical Practice Research Datalink) is a resource providing access to anonymised UK primary care records and other linked databases for the purposes of clinical and public health research. The resource has been active for more than 30 years and holds data on >14 million unique individuals.

By accessing data within the CPRD, this project will aim to understand the number of children presenting to their GP with recurrent mouth ulcers, the patterns of referral, treatment and risks of developing a systemic inflammatory condition. Improved understanding will allow doctors to reassure families in children who are at low risk and identify those children that warrant a referral to a specialist.

The project will include:

1. A systematic review of the current literature on recurrent mouth ulcers in children
2. Skills training in database management and data analysis from large data sets
3. Develop data extraction skills to access data from CPRD
4. Access to relevant paediatric rheumatology clinics to understand clinical relevance of research question by meeting patients with inflammatory conditions such as Behcet’s and lupus
5. Supervision and mentoring to gather skills in writing up research findings for abstract submission to conference and in paper form to peer-reviewed journal.
The successful candidate will join a multi-disciplinary Paediatric Rheumatology Research team that are based in the Institute of Child Health at Alder Hey which is the only Centre of Excellence for Childhood Lupus, one of three Centres of Excellence for Behcet’s and is the UK’s first and only “Experimental Arthritis Treatment Centre for Children” (EATC).

It will provide a good foundation for those students who may be interested in research as part of their medical career and it will strengthen applications for those considering a career in paediatrics. You will be closely supervised, and work with other MPhil students. We would expect the project to be presented at national meetings in the UK and for the data to be submitted for publication.

This project could also be offered as an MRes.

For more information, please contact Dr Clare Pain, Consultant Paediatric Rheumatologist clare.pain@alderhey.nhs.uk

**h. Raynaud’s phenomenon in children and young people: what are the risks of development of a rheumatological condition? (Pain/Beresford)**

Around 12-15% of children have symptoms of Raynaud’s phenomenon (colour change and cold, painful hands often triggered by cold or stress) although not all go to see their GP. Whilst most children have primary Raynaud’s (a benign condition) a small number may have secondary Raynaud’s which can be associated with digital ulceration, ischaemia and lung/heart involvement. Raynaud’s can be the presenting feature of serious rheumatological conditions such as Systemic Scleroderma or Lupus.

Studies in adults with Raynaud’s have shown that changes in autoantibodies and nail fold capillaries can help identify those at risk of development of a serious condition. There have been no large prospective studies in children. This means it is difficult to understand the risk of progression to a potentially life-threatening condition in children who present with Raynaud’s. This is difficult for families and doctors as they do not know how to follow-up or manage these children.

The CPRD (Clinical Practice Research Datalink) is a resource providing access to anonymised UK primary care records and other linked databases for the purposes of clinical and public health research. The resource has been active for more than 30 years and holds data on >14 million unique individuals.

By accessing data within the CPRD, this project will aim to understand the number of children presenting to their GP with Raynaud’s, the patterns of referral to specialist care, treatment and risks of developing a systemic inflammatory condition. Improved understanding will allow doctors to reassure families in children who are at low risk and identify those children that warrant a referral to a specialist.

1. A systematic review of the current literature on Raynaud’s in children and young people
2. Skills training in database management and data analysis from large data sets
3. Develop data extraction skills to access data from CPRD
4. Access to relevant paediatric rheumatology clinics to understand clinical relevance of research question by meeting patients with primary and secondary Raynaud’s, systemic scleroderma and lupus.
5. Supervision and mentoring to gather skills in writing up research findings for abstract submission to conference and in paper form to peer-reviewed journal.

The successful candidate will join a multi-disciplinary Paediatric Rheumatology Research team that are based in the Institute of Child Health at Alder Hey which is the only Centre of Excellence for Childhood Lupus, and is the UK’s first and only “Experimental Arthritis Treatment Centre for Children” (EATC).

It will provide a good foundation for those students who may be interested in research as part of their medical career and it will strengthen applications for those considering a career in paediatrics. You will be closely supervised, and work with other MPhil students. We would expect the project to be presented at national meetings in the UK and for the data to be submitted for publication.

This project could also be offered as an MRes.

For more information, please contact Dr Clare Pain, Consultant Paediatric Rheumatologist clare.pain@alderhey.nhs.uk
4) Neurodevelopmental Paediatrics

a. Examining and measuring neurodevelopmental outcomes in infants and children affected by prematurity or infections in global health or UK settings (Gladstone)

An MPhil in Neurodevelopmental paediatrics could include research into interventions to improve outcomes of those with neurodevelopmental disorders or delay in the UK or in low income settings. This could include studies looking at identification and screening for infants born prematurely or those who are at risk of developmental delay. We have conducted studies on the use of neurodevelopmental assessment tools, behavioural assessment tools, maternal child interaction measures and measures to assess participation and functioning of children with disabilities.

Our research group works on the feasibility of low cost interventions for parents of children with neurodevelopmental delay and disabilities both in low resource settings and within the UK. We are working closer with Liverpool Community Health and have conducted work looking at family centred approaches to care for children with neurodisabilities in Liverpool using parent feedback tools. We also have looked at the investigation and management of a range of neurodevelopmental disorders including ADHD and ASD in Liverpool as well as in low income settings in Africa.

A further study could be conducted on the present screening programmes conducted in Merseyside by health visitors who are using the Ages and Stages developmental screener to identify children with problems.

We are doing a number of projects in Malawi (STREAM) and in Gambia/Kenya (DYAD) that could potentially be a springboard for a student who would like to work on a project overseas looking at neurocognitive outcomes of children in these settings. We are also conducting assessments of adversity and socioemotional issues within families and looking at validating tools for use in these settings.

Contact melglad@liverpool.ac.uk for more information

b. Art and dance interventions to support children with disabilities in Liverpool

We are working with the Brain Charity in Liverpool who are providing online support as well as workshops for children (in person) prior to the pandemic. We are hoping to measure efficacy of the intervention both from a qualitative and a quantitative perspective and would value a student who might want to work with us on this project from either a qualitative or a quantitative perspective.

Contact melglad@liverpool.ac.uk for more information

c. Childhood disability and participation - what should we measure and how (Gladstone)

This MPhil project could specifically look at the measurement of neurodevelopmental delay and disability in low income or UK settings. There also could be a focus of work relating to present studies
being conducted in Malawi or elsewhere globally or in other neurodevelopmental insults in low income settings.

We have had previous MPhil students who have completed excellent qualitative studies in Liverpool relating to the care of children under the age of 2 (linked with the Liverpool Women’s Hospital NNU as well as Liverpool Community Health) both which have since been presented at national and international meetings and written up for publication. We will support the training for conducting qualitative studies, systematic reviews or quantitative work. We will also support the possibility of conducting research in a LMIC setting if feasible and funding available at the time. We would be keen to support a student doing a project on the views and experiences of adolescents with disabilities in Liverpool.

Contact melglad@liverpool.ac.uk for more information.

d. Perceptions and views of training and support for identification of children with developmental disorders in Liverpool (Gladstone)

With our previous experience of MPhil students conducting projects on perceptions and views of professionals and parents in neurodevelopment – one area we would like to explore is how professionals feel they are trained and qualified to identify children with neurodevelopmental disorders both in paediatric practice and in the community. We are doing some work in this area also in Nigeria and in Malawi so we could partner with these groups and link work.

Contact melglad@liverpool.ac.uk for more information

5) Paediatric Respiratory

a. Chest infections in children with neurological impairment and how to manage them (McNamara/Fothergill)

Children with neurological impairment (NI) suffer lung infections that can result in significant morbidity and premature death. Infections with the pathogen Pseudomonas aeruginosa are especially common. Although there has been a lot of research into P. aeruginosa lung infections in patients suffering other diseases, such as cystic fibrosis or bronchiectasis, our understanding of P. aeruginosa infections in children with NI is poor.

In this study, you will:

i. Investigate respiratory treatment and symptom burden in a large cohort of children with ND through interactions with the neuro-respiratory physiotherapy team.

ii. Working with Dr Jo Fothergill from UoL’s Institute of Infection, Veterinary and Ecological Studies (IVES), use a combination of genomics and phenotyping to characterise P. aeruginosa populations infecting children with NI to establish the importance of cross infection (particularly in schools), analyse the stability of the P. aeruginosa population over time, and determine whether P. aeruginosa populations adapt and diversify in a manner characteristic of other difficult to treat chronic lung infections.
This ground-breaking research will establish a baseline for the design of future studies aimed at better therapeutic approaches for this under-studied group of patients.

Please contact Prof Paul McNamara (mcnamp@liverpool.ac.uk) for more information

b. Predicting disease severity in infants with bronchiolitis (McNamara/van Miert)

Bronchiolitis is an acute respiratory condition of infancy, often caused by Respiratory Syncytial Virus (RSV). In the UK, it’s the 2nd commonest cause of paediatric medical hospitalisation after asthma. No specific cures are available and the mainstays of treatment remain supportive. Most infants recover quickly from this illness but there is a small proportion of those hospitalised who require intensive care. Unfortunately, we cannot predict which infants will deteriorate.

At Alder Hey, we have a long published track record of investigating RSV disease in children. Much of the morbidity associated with RSV bronchiolitis is due to the host immune response to infection and we were one of the first groups to carefully document this in the lungs of babies with severe disease. We were also first to highlight the importance of viral co-infection in bronchiolitis and its link to disease severity. More recently, as part of an NIHR funded clinical PhD-studentship, we have developed a clinical score to assess disease severity in infants with bronchiolitis.

The aim of this study is to combine our severity score with inflammatory markers in respiratory secretions to find out whether we can predict which infants will deteriorate in hospital. Ethical approval is already in place for you to undertake this study.

We are looking for enthusiastic medical students with enquiring minds. You will be spending time in the laboratory (don’t worry about this, we’ll teach you all the lab skills you’ll need to complete this project!) and on the wards seeing children with bronchiolitis and assessing their disease severity. It is expected that you will gain at least one publication from your studies and that you will present your findings at an international respiratory conference in either the USA or Europe. As a group, we have a track record of successfully bringing MPhil students through into AF, ACF and ACL posts.

For further detail, please contact Professor Paul McNamara (mcnamp@liv.ac.uk)

c. Evidence based approaches to paediatric (Sinha/Nolan/Hawcutt)

This MPhil will involve a systematic review and meta-analysis of commonly used therapies in paediatric asthma (steroids and add-on therapies), and some work with parents and clinicians to identify how the results of this evidence should be presented to them to maximise the usefulness of the review. There is an opportunity to supervise two MPhil students for different aspects of this project.

Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) for more information
d. Exploring the impact of air pollution on school attendance in Liverpool (Semple)
The student will be supervised by Prof Calum Semple who is happy to discuss the project either in person at the Institute in The Park at Alder Hey, by email m.g.semple@liverpool.ac.uk or by skype (ID=maes_celyn)

e. Systematic Review of an intervention for CF (Southern/Sinha)
At the end of this year we will expect the student to:

- Publish a protocol on the Cochrane database
- Publish a full review on the Cochrane database
- Present these findings at an international CF Conference
- Review outcome measures that are pertinent in CF and define a core outcome set
- Be confident at searching for appropriate levels of evidence
- Be able to identify the potential sources of bias in clinical trials
- Be able to undertake a meta-analysis of data from several different studies

Supervisors for this MPhil will be Prof Kevin Southern and Dr Ian Sinha. Both supervisors have completed several Cochrane reviews and are actively involved in the CF and Genetics Disorders Cochrane Review Group, which is based at Alder Hey.

The project will focus on an intervention for the condition, Cystic Fibrosis.

For more information on this project contact Kevin Southern, kwsouth@liv.ac.uk

f. Exploring the acceptability of dexamethasone to children with acute severe asthma (Bracken/Hawcutt/Peak/Gill)
Many paediatric centres now use Dexamethasone as the steroid of choice for the treatment of acute asthma. The single dose required would seem to be an advantageous compared with 3 days of prednisolone, however, the views of parents, children and young people have not been investigated regarding this change. This project would investigate the acceptability of a single dose of oral dexamethasone and the formulations used for children and young people with acute asthma and whether any adverse drug reactions to dexamethasone have been experienced.

The successful student will be supported within the multi-disciplinary Paediatric Medicines Research Unit based at Alder Hey https://alderhey.nhs.uk/healthier-future/research/paediatric-medicines-research-unit. This is an excellent opportunity to develop new skills in data collection and analysis, critical thinking and will present their findings at national meetings and in peer reviewed publications. They will have an opportunity to work with clinicians recruiting patients to the study, and the families and patients that participate.

Contact details: Dr Louise Bracken (Louise.Bracken@alderhey.nhs.uk)
6) Paediatric Gastroenterology  
   a. Can probiotics prevent coeliac disease? (Allen)  
Coeliac disease is amongst the most common auto-immune diseases affecting almost 1% of people. It serves as a paradigm for autoimmunity and intestinal inflammation because the offending antigen (gluten) and consequent immune dysregulation are well known. The intestinal microbiome modulates the development of the intestinal and systemic immune system in early life. The microbiome can itself be modulated by probiotics, such as lactobacilli and bifidobacteria, which may prevent the development of auto-immune diseases. Given that the risk of the condition is about 1 in 10 amongst first degree relatives of an index case, a study evaluating probiotics in the prevention of coeliac disease may be feasible.

In this project, you would:

- Review the pathogenesis of coeliac disease
- Review the host and environmental risk factors for developing the condition
- Review what probiotics possess mechanisms that may modulate the developing immune system in early life to counter the immune dysregulation in coeliac disease
- Propose a study to test probiotics in the prevention of coeliac disease amongst first degree relatives of an index case

Given the broad scope of the topic, 2 students could work together on this project.

For more information on this project contact Prof Stephen Allen: Stephen.Allen@lstmed.ac.uk

7) Paediatric Endocrinology/Diabetes  
   a. Investigating the impact of illness severity/trauma symptoms at diagnosis on later acceptance of Type 1 Diabetes (Hawcutt/Deakin/Carcson)  
Type 1 diabetes is a lifelong condition which can have a significant impact on the life of a young person and their family. Good management and support through insulin therapy, education and psychological services are essential to promote lifelong management and positive outcomes (NICE, 2015). There are approximately 27,115 children and young people with diabetes in the UK. One of the most emotional experiences for young people and parents of a child with diabetes is receiving their diagnosis. Previous research suggests grief reactions similar to those related to bereavement or post-traumatic stress responses.

In the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), trauma is described as the experience of intense fear, helplessness, horror or disorganised and agitated behaviour in response to exposure to an event directly or as a witness- that caused or threatened serious injury or violation of body integrity. Traumatised children often present an array of symptoms which may include the loss of recently acquired developmental skills (regression), the emergence of new fears or re-activation of old ones, accidents and reckless behaviour, separation anxiety and psychosomatic complaints. Additionally, young children may express post-traumatic anxiety through hyperactivity, distractibility and increased impulsivity.
Therefore, better understanding of how a young person’s illness severity and experience of trauma at diagnosis impacts on their later acceptance of diabetes would be beneficial. Findings could influence the effectiveness of structured education sessions delivered to families immediately post diagnosis and would influence how we deliver our training. Findings may also determine how we approach and manage newly diagnosed patients with regards to referrals to Psychological Services and subsequent psychological interventions.

**Proposed Outcome Measures**

**At diagnosis**
Severity of illness/Duration of admission  
Glycaemic control – HbA1c/ Diabetes distress – Problem Areas in Diabetes Scale-5 (PAID-5)  
Trauma measure

**At first clinic (within 3 months)**
Glycaemic control – HbA1c/ Diabetes distress – PAID-5  
Trauma measure  
Diabetes Acceptance – DAAS  
Diabetes-related coping – Freiburg Questionnaire of Coping with Illness (FQCI)  
Quality of life – Euro-Qol five-dimension health questionnaire (EQ-5D)  
Self-management – Diabetes Self-Management Questionnaire (DSMQ)

**At second clinic (within 6 months)**
Glycaemic control – HbA1c/ Diabetes distress – PAID-5  
Trauma measure  
Diabetes Acceptance – DAAS  
Diabetes-related coping – Freiburg Questionnaire of Coping with Illness (FQCI)  
Quality of life – Euro-Qol five-dimension health questionnaire (EQ-5D)  
Self-management – Diabetes Self-Management Questionnaire (DSMQ)

*Contact Dan Hawcutt (dhawcutt@liverpool.ac.uk) or Mark Deakin (mark.deakin@alderhey.nhs.uk) for more information*

**b. Turner Syndrome project (Blair/Lip)**

Turner Syndrome affects approximately one in 2,500 live female births. Affected girls experience a wide range of health problems including an increased risk of bone, metabolic and cardiovascular disease and premature death. A recent study reported that cortisol levels in hair are higher in girls with Turner Syndrome than in unaffected girls. We speculate that abnormal cortisol release in Turner Syndrome may contribute to poor metabolic, cardiovascular and bone health.

The successful student will join a collaboration of paediatric endocrinologists, pharmacologist and clinical academics in adult cardiology to explore this hypothesis through analysis of cortisol profiles, and clinical studies of vascular function and markers of metabolic disease.

The student will work closely with girls with Turner Syndrome and their families. They will learn new clinical skills, further develop critical thinking, prepare a literature review and generate presentations and publications in peer reviewed journals.

*Contact: Jo Blair*  
jo.blair@alderhey.nhs.uk
8) Neonatology

a. Nutrition, metabolism and the developing immune system in preterm infants (Morgan)

Very preterm infants are dependent on parenteral nutrition (PN) in the first 2 weeks of life while the gut adapts to enteral feeding. This is a critical period of metabolic change and immune development as the premature infant has to adapt to extra-uterine life much earlier than is physiological. PN has a number of components that can influence immune system development and we have recently been studying the parenteral amino acid formulation and its effect on inflammatory pathways and T-cell function. This work has focussed on modifying arginine content. There is already evidence in neonates and older children that parenteral amino acid formulations can affect the risk of infection and important inflammatory conditions in the preterm infants such as necrotising enterocolitis. Post-operative neonates are another group of infants who could benefit from nutritional measured to enhance early immune response.

The student will be involved in one of two clinical studies: one in preterm infants at Liverpool Women’s Hospital (PAINT18) and one in surgical neonates at Alder Hey Children’s Hospital (ASPIRE). These studies are the next in a series of physiological studies exploring the optimal amino acid formulation in babies born <29 weeks gestation and in term and preterm surgical neonates. Students will be able to gain experience in a range of analytical methods in the field of genomics and metabolomics. Students will be able to determine how these techniques can be used to investigate how immune and metabolic pathways change in the first few critical days after birth. MPhil students will have some choice over the areas they would like to focus on given the breadth of the project and data.

The project will be supervised by Prof Colin Morgan, Consultant Neonatologist, (colin.morgan@lwh.nhs.uk) who will be happy to discuss this further and introduce you to others involved in this work.

b. Neonatal acute kidney injury (McWilliam/Paize)

Neonates admitted to a neonatal intensive care unit (NICU) are at increased risk of acute kidney injury (AKI). Developing AKI brings an increased risk of mortality, prolonged hospitalisation, and long term morbidity in the form of chronic kidney disease. Unwell neonates often have multiple risk factors for developing AKI (prematurity, sepsis, nephrotoxins and many others). We are interested in how we might predict those likely to develop AKI in this population.

This project will include:

1. Systematic review of literature on epidemiology and prediction of AKI in neonates.
2. Analysis of Liverpool Women’s Hospital NICU electronic medical record data to describe incidence of AKI and risk factors for AKI.
3. Contribute to the design of a clinical study or quality improvement project aiming to reduce the incidence of AKI in neonates.
We anticipate this work will lead to presentations at national conferences and submission for publication. This work will contribute to an ongoing quality improvement project aiming to reduce the incidence of AKI in the NICU.

For more information, please contact Dr Steve McWilliam, NIHR Academic Clinical Lecturer in Paediatric Clinical Pharmacology: stevemcw@liverpool.ac.uk

c. Understanding adrenal function in premature babies (Blair/Morgan)
Cortisol is a steroid hormone, produced by the adrenal gland, which has a critical role in maintaining the internal environment of the body. Cortisol deficiency is a potentially fatal condition.

The normal concentration of cortisol in infants born prematurely is largely unknown, in part because the collection of blood samples for research purposes is difficult in preterm infants. We think that healthy infants have lower cortisol concentrations than older children and adults. This is important, because infants might be treated inappropriately with hydrocortisone (the medicine form of cortisol), and experience side effects of treatment with no benefit.

The utility of saliva as a medium in which to measure cortisol has been recognised for some time, and our group recently published data from healthy children and young people. In this study, the successful student will work closely with a team of neonatologists, endocrinologists, pharmacologist and biochemists to develop a robust set of data describing the normal range of adrenal gland hormones in the saliva of infants born between 30 and 33 weeks gestation, cared for in the Neonatal Unit at Liverpool Women’s Hospital. They will explore how cortisol concentrations change over time, and how they might be related to birth size and other clinical features. This important study will inform the management of infants in the future, as well as making an important contribution to our knowledge about the maturation of this hormone pathway in neonatal life.

They will learn new clinical skills, further develop critical thinking, prepare a literature review and generate presentations and publications in peer reviewed journals.

Contact: Jo Blair (Jo.blair@alderhey.nhs.uk)

d. Improving cardiovascular outcomes in preterm infants (Neary/Morgan)
An MPhil in neonatal haemodynamics could include research into interventions to improve outcomes of preterm and term neonates in the UK. There is growing evidence of the pivotal role the cardiovascular system has in the overall well-being of both term and preterm infants. The MPhil student will join a highly successful multidisciplinary team of neonatologists and cardiologists passionate about neonatal echocardiography. Liverpool Women’s Hospital is part of Neonatal Haemodynamics Research Centre. Our research group will be undertaking a clinical study comparing simulation echocardiography education with traditional teaching.

The focus of the project will include:

i. Literature review of simulation education in neonatal echocardiography
ii. Part of a team undertaking a prospective study in neonatal simulation

The project will be supervised by Dr. Elaine Neary, Consultant Neonatologist ([Elaine.neary@lwh.nhs.uk](mailto:Elaine.neary@lwh.nhs.uk)) who will be happy to discuss this with you further. Successful candidates will aim to present their work at international conferences and publish in peer reviewed journals.
Women’s Health

1. Gynaecology

    a. An exploratory study aiming to explain why women menstruate (Hapangama/de Magalhaes/Hill)

Menstruation is the hallmark of “the reproductive period” in a woman’s life. However, it is not essential for conception and except for humans and upper order primates, most animals do not menstruate. The exact reason for menstrual shedding, which is a biologically expensive process is not understood. Some recent work has identified the accumulation of leucocytes and changes in the cellular fate of the endometrium in the secretory phase of the endometrial cycle may hold the key to the reason why menstruation is necessary for the human endometrium.

This project explores this novel hypothesis by examining the dynamic changes in endometrial cell fate, using primary cell culture and explants tissue culture methods as well as advanced molecular biological techniques. The published and in house generated microarray data sets will also be interrogated using system biological tools. The student will have the opportunity to work with several groups collaborating with us to expand his/her data and to examine the aberrations in this process in conditions such as heavy menstrual bleeding. The data generated may present new treatment methods for common gynaecological disease.

Supervisor: D Hapangama/de Magalhaes/Hill

Contact email: dharani@liv.ac.uk

    b. Examination of the 3-dimensional architecture of the human endometrium; how is it perturbed in gynaecological pathologies such as endometriosis? (Hapangama/Hill/Tempest)

The human endometrial 3D architecture has been reconstructed for the first time by our group and we are now exploring how the normal histo-anatomical architecture is perturbed in endometrial pathologies such as cancer. Stem cells are postulated to play a central role in endometrial carcinogenesis, therefore the changes in 3D architecture in relation to the postulated progenitor cell niche will be examined. The project will provide exposure to advanced techniques such as 3D modelling, qPCR, laser capture micro-dissection, histology and imaging.

We have developed 3D cell culture models of the endometrium and ectopic endometrium, and the student(s) will be able to learn advanced cell culture methods and test novel agents in treating these

Supervisors: D Hapangama/C Hill/N Tempest

Contact email: dharani@liv.ac.uk
c. Chicken or egg? In adenomyosis, was the endometrium always abnormal, or did it change when it became abnormally located?

Adenomyosis is a condition defined by the presence of endometrial epithelial and stromal cells in the myometrium. The cause is unknown, but one theory is that endometrial cells from the basalis layer of the endometrium invade the myometrium. Conflicting evidence exists regarding whether the eutopic (correctly located) endometrium is normal, or abnormal in women with adenomyosis. What happened first, was the endometrium always abnormal, or did it become abnormal when it was incorrectly located? This project will compare the eutopic endometrium with the adenomyotic lesions in women with adenomyosis, using both wet and dry experimental techniques including bioinformatics, immunostaining, and qPCR.

*Supervisor: A Maclean/ C Hill/ D Hapangama*

*Contact email: dharani@liv.ac.uk*

2. Obstetrics

   a. Uncovering fraudulent research in women’s health (Weeks)

There is a long and sad history of fraudulent medical research being conducted in pregnancy and childbirth. The most famous UK case in the 1990s led to the resignation of Prof Chamberlain who was at that time was both president of the Royal College of Obstetricians as well as the Editor in Chief of the British Journal of Obstetrics and Gynaecology. Since then, the regulations in the UK have tightened considerably. However, the regulatory environment in other countries is far less strict and recently Professor Mol’s team in Monash University has found evidence of repeated plagiarism and fraud in published research (see Bordewijk et al. Data integrity of 35 randomised controlled trials in women’ health. Eur J Obstet Gynecol Reprod Biol. 2020;249:72-83).

The Department of Women’s and Children’s Health in the University of Liverpool hosts the Cochrane Pregnancy and Childbirth Group who evaluate and synthesise clinical trials. Prof Weeks is an author of several of these, especially reviews of post-partum haemorrhage. The student will search through the systematic reviews for evidence of fraud, using pre-defined criteria. Research papers that arouse suspicion will be examined in more detail and the references searched for similarities in data or text. Uncovering of fraud will lead to contacts with the journal to request further data as well as publication.

The student will work within the Sanyu Research Unit in the University of Liverpool based within Liverpool Women’s Hospital.

*Supervisor: Prof Andrew Weeks*

*Contact email: aweeks@liv.ac.uk*
b. Examination of pregnancy outcomes in multiple pregnancy (Sharp)

Liverpool Women’s Hospital hosts one of only a few specialised multiple pregnancy clinics in the UK. This clinic has been running for more than 15 years with over 150 twins or higher per year. This study will focus on clinical outcomes from multiple pregnancies managed within this clinic.

The student will be responsible for analysing the historical data from the multiple pregnancy clinic. This data will involve biometric (scan) data, biomarkers and clinical outcome data. This will be the student’s primary responsibility.

Additional prospective activity may be developed in subjects aligned to twin pregnancy such as neonatal outcomes and patient experience. The student will be expected to continue to develop their knowledge and engage with the patient & public (PPI) meetings during their course.

The student will work within the Harris-Wellbeing Preterm Birth Research Centre in the University of Liverpool based within Liverpool Women’s Hospital.

Supervisor: Dr Andy Sharp

Contact email: asharp@liv.ac.uk

c. Examination of pregnancy outcomes in preterm birth (Sharp/Alfirevic)

Liverpool Women’s Hospital hosts a dedicated preterm birth prevention clinic, which is the clinical focus of the Harris-Wellbeing Preterm Birth Research Centre a dedicated research centre for the prevention of preterm birth.

The student will be responsible for analysing the historical data from the preterm birth clinic. This data will involve cervical length records, biomarkers and clinical outcome data. This will be the student’s primary responsibility.

Additional prospective activity may be developed in subjects aligned to preterm birth such as neonatal outcomes and patient experience. The student will be expected to continue to develop their knowledge and engage with the patient & public (PPI) meetings during their course.

The student will work within the Harris-Wellbeing Preterm Birth Research Centre in the University of Liverpool based within Liverpool Women’s Hospital.

Supervisor: Dr Andy Sharp

Contact email: asharp@liv.ac.uk