Host department: Southampton

Project Title:
Developing and evaluating tools to reduce antibiotic use for acute exacerbations of asthma in primary care

Proposed supervisory team:	**Names and areas of expertise to be included**

Prof Nick Francis (Soton) – Academic GP with interest in infections research
Dr Ingrid Muller (Soton) – Health Psychologist with interest in behaviour change interventions
Prof Chris Griffiths (QMUL) – Professor of Primary Care and Co-Director of Asthma UK Centre for Applied Research

Potential for cross consortium networking and educational opportunities:
This will be a collaboration between two SPCR members – Southampton and QMUL. The student will benefit from the strong links between SPCR members in infections research and with the link to the Asthma UK Centre for Applied Research. In addition, this project fits well with expertise in Southampton, including the Southampton NIHR Biomedical Research Centre (Francis is a member of both the Infections and Respiratory themes put forward in the recently submitted bid for the next BRC round).

Project description:

Background

Asthma is the most common long-term respiratory condition and is a major cause of morbidity, primary care consultations and emergency hospital admissions.

People with asthma commonly develop chesty coughs and other respiratory symptoms which cause them to consult in primary care. Evidence and guidelines suggest that most people with asthma who experience new or worsening respiratory symptoms have an asthma exacerbation triggered by a viral infections, allergens, exercise, changes in the weather, pollution or other factors, and that antibiotics should not routinely be given. However, antibiotics are commonly prescribed for asthma exacerbations and people with asthma are prescribed many more courses of antibiotics than people who do not have asthma.

Use of antibiotics promotes the development of antimicrobial resistance causing infections that are more difficult to treat. Unnecessary use of antibiotics also wastes resources, can cause unpleasant side effects, can be a distraction leading to underuse of evidence-based interventions, and may cause other adverse effects due to changes in an individual's microbiome.

The aims of this PhD are to: **1) systematically review the evidence for features of asthma exacerbation predictive of bacterial infection, 2) explore the clinician, patient and environmental factors associated with use antibiotics in asthma, 3) develop an intervention (combining behaviour change approaches and improved diagnostic tools) for clinicians and patients to support the more targeted use of antibiotics in asthma, 4) conduct a feasibility trial to explore barriers and facilitators, and obtain estimates of key feasibility parameters, to inform an adequately powered effectiveness trial of the intervention in primary care.**

Methods

1) systematic review, 2) qualitative interview studies of patient, clinician and environmental factors associated with antibiotic use; 3) intervention development using the person-based approach with key stakeholders; 4) feasibility trial in 8-10 primary care practices.

Potential impact

This programme of research will lead to an evidence-based intervention designed to provide more targeted use of antibiotics for people with asthma. This should lead to an overall reduction in use of

antibiotics while ensuring that those most likely to benefit are provided with antibiotics in a timely fashion. Following this PhD, we would seek funding to evaluate the effects of this intervention in a fully powered RCT.

Training and development provision by host:

Formal training:

The training plan will be informed by an analysis of the academic needs of the PhD candidate carried out in the first month. Training will be directed towards helping the candidate develop as an independent researcher, as well as towards the needs of the PhD project.

The formal taught postgraduate research training programme at the University of Southampton includes epidemiology, statistics, research governance and study design. In addition, transferable skills courses are offered including Good Clinical Practice, time management, leadership, grant writing, and presentation skills. The Fellow will also be able to access free on-line masterclasses on systematic reviews and meta-analysis, research governance, ethics, patient and public involvement and engagement, developed by leaders in the SPCR.

Informal training:

The student will also be offered mentorship from a senior primary care academic. Mentors receive formal training, developed by the Society for Academic Primary Care, to ensure independence and appropriate support. The Fellow will also have access to informal mentoring from senior members of the collaboration at an annual training meeting, and to participate in doctoral exchange programmes.

PPIE:

Patients with Asthma have reviewed this outline and commented on the need for better information to support decisions about use of antibiotics for people with asthma. If funded, the project will recruit two public contributors with lived experience of asthma to help design the study and interpret and disseminate findings. The student will also benefit from working with our well established PPI team, including our PPI core contributors at the University of Southampton Primary Care Research Centre, and the Wessex Public Involvement Network.

Host department: Southampton

Project Title:
Developing robust cancer risk scores for lung and colon cancer in primary care

Proposed supervisory team: Names and areas of expertise to be included
- Professor Paul Little (clinical and quantitative expertise)   - Professor Geraldine Leydon (sociology and qualitative expertise)   - Dr Taeko Becque (Southampton) and Dr Richard Stevens (Oxford) (statistical expertise)   - Professor Lucy Yardley (Southampton and Bristol; Health Psychology/behavioural expertise)

Potential for cross consortium networking and educational opportunities:
This project build on long term networking among departments in the consortium with strong interests in clinical scoring methods and will network with all members contributing to the original prospective CANDID cohort - Universities of Keele, Manchester, Nottingham, Oxford, University College London, Birmingham, and Cambridge In addition to the opportunities for the post holder the project will provide educational opportunities for early career clinical researchers (e.g. ACF) and non-clinical researchers from each of the above original contributing groups.

Project description:

The proposed project is aligned closely with the £2.5 million CANDID cohort, a flagship prospective diagnostic cohort for two of the commonest cancers in clinical practice (lung and colon), funded by the NIHR through the School for Primary Care Research (SPCR), and is a collaboration across 8 departments.

For lung cancer, NICE guidelines suggest that any haemoptysis, or cough lasting longer than three weeks should be investigated with a CXR but we know that for the commonest acute infection presenting in primary care (chest infection) the median duration of symptoms is 3 weeks so this guidance arguably is setting much too low a threshold for investigation. There is also evidence from secondary care settings that a normal X ray may not be helpful in excluding cancer. If clinicians in primary care acted on the NICE guidance for X rays this could dramatically increase the number of CXRs performed for the primary care population, which is likely to increase the dangers of iatrogenesis, and may not be cost-effective. A clinical prediction rule based on prospective clinical data collection and assessing the place of simple investigations in primary care (full blood count, CXR) is the most robust way to better inform thresholds for such investigations and for referrals. Similar considerations about efficient referral and limiting iatrogenesis apply to colon cancer.

There is suggestive evidence that clinical prediction rules (CPRs) for diagnosing both lung and colon cancer can be developed in primary care. However, current prediction rules 'weight' each variable based on routinely collected observational data i.e. what a GP happens to record, and not based on structured and consistent data collection. Such scores have the great advantage of efficiently identifying possible 'signals' for cancer but given the major limitations due to differential recording of clinical data by GPs, they make it difficult to adequately quantify the importance of individual variables and their possible weighting – and so make it extremely difficult to develop valid CPR risk scores.

There have been no sufficiently powered prospective primary care cohort studies to develop CPRs, nor to test and validate such rules in primary care cohorts. We also have limited information about the key issues for doctors and patients in engaging with using risk scores, and unless we do understand the issues CPRs will not be used effectively in practice.

The objectives of CANDID are:
1) To use prospective diagnostic cohorts to develop and validate Clinical Prediction Rules for lung and colon cancer
2) To assess the incremental utility of incorporating additional measures (e.g. genetic, inflammatory and lifestyle information including smoking and alcohol status) in the prediction models.

CANDID has now finished recruiting more than 20,000 patients who are currently being followed up in the cancer registries and also in GP records to see if cancer develops. The whole of the CANDID data set will be available to the fellow. A range of PhDs are possible for the doctoral fellow, using either quantitative or qualitative

methologies or both (mixed methods) depending on the preference and interests of the fellow, and to be agreed with the supervising team.

Qualitative methods: the fellow would explore the key issues among both patients and doctors in using clinical scoring systems (both existing clinical scores and the scores developed from CANDID) with a view to developing an effective training package, working with both clinicians and patients. The theoretical framework for the PhD would include theories of behaviour change, including Protection Motivation Theory (for patients) and May's Normalisation Process Theory (NPT) (for clinicians). The work with clinicians will address key questions such as do practitioners agree about the usefulness of CPRs?; are they viewed as a legitimate part of their work?; how are they implemented and which methods do clinicians favour/use?; and how is the 'work' of using CPRs understood? The work with patients will address questions such as what are the benefits and problems associated with communicating personal risk based on CPRs?; and how best should this risk information be communicated?;

Quantitative methods: the fellow would use the CPR based on prospective data collected in CANDID, and also scores based on the existing CPRs, and compare how well each score compares with the observed risk of cancer. An extensive range of other baseline measures have also been collected in CANDID (such as satisfaction with life; life orientation, cancer fatalism, illness behaviours, attitudes to doctors, attitudes to medical threats, diet, physical activity, continuity of care, multi-morbidity) which will allow the fellow to explore the way bio-psychosocial variables determine both the presentation of cancer related symptoms and also the risk of developing cancer.

Training and development provision by host:

Formal training:

The training plan will be informed by an analysis of the academic needs of the candidate carried out in the first month. Training will be directed towards helping the candidate develop as an independent researcher, as well as towards the needs of the programme.

The formal taught postgraduate research training programme at the University of Southampton includes epidemiology, statistics, research governance and study design. In addition, transferable skills courses are offered including Good Clinical Practice, time management, leadership, grant writing, and presentation skills. The candidate will also be able to access free on-line masterclasses on systematic reviews and meta-analysis, research governance, ethics, patient and public involvement and engagement, developed by leaders in the SPCR.

Informal training:

The Fellow will also be offered mentorship from a senior primary care academic working in an external institution, meeting twice a year. Mentors receive formal training, developed by the Society for Academic Primary Care, to ensure independence and appropriate support. The Fellow will also have access to informal mentoring from senior members of the collaboration at an annual training meeting, and to participate in national and international (Brisbane) exchange programmes.

PPIE:

Named PPI individuals joined the research team from the start and were involved in the development of the original application, and in the development of patient facing materials. Our collaborators supported the proposed elements of the investigation - but particularly the development of simple tools for doctors to use in the consultation in discussion with patients. We had additional external PPI review to refine proposals from the SPCR review panel which supported the proposals aims and methods. We will work with PPI collaborators to ensure that this research continues to address the needs of patients and the public and that the clinical prediction rules are feasible and acceptable to patients. PPIE collaborators will lead the development of proposals for dissemination.

Host department: Southampton

Project Title:
Meetings between experts: understanding patient and clinician (de)-prescribing discussions and decisions in primary care

Proposed supervisory team:
Geraldine Leydon – Southampton Fiona Stevenson – University College London **Note:** The rest of the team to be determined depending on needs/interests of the successful candidate. The supervisors offer expertise in the study of health care interaction, antibiotic prescribing/managing common infection, prescribing in primary care, medical sociology, intervention design and evaluation, qualitative methodology, conversation analysis, thematic analysis, digital health. Clinical research scientist scholars from apt disciplinary/methodological backgrounds will be added to the supervisory team once the candidate is appointed and we determine the most appropriate person (e.g. nurse or GP; specialist in specific aspects of communication and so on).

Potential for cross consortium networking and educational opportunities:
The project includes access to mid and senior-level researchers across two SPCR departments (University College London, Southampton). The candidate will have access to leading experts in primary care, communication research/science of talk, medical sociology, and qualitative methodologists.

Project description:
Data sets collected in recent years from UK primary care hold more than 600 face to face and telephone primary care consultations between GPs/nurses/patients. The PhD offers a wonderful opportunity for a candidate interested in understanding how clinicians communicate with patients around prescribing and de-prescribing Many of the video/audio recordings were transcribed and coded drawing on relevant communication research to discriminate key features and outcomes. The coding framework was largely numerical, and it drew on the International Classification for Primary Care (ICPC), combined with some textual coding to enable further understanding of the consultation data collected. This included coding details of the problem presented including the nature of the problem presented, diagnosis, and outcome/prescriptions. There is scope for further analyses of this unique corpus to deepen our understanding, both qualitatively and quantitatively, of key conversational patterns when different types of prescribing decisions are made. This is a great opportunity to analyse a novel data set to advance our knowledge of communication 'at the coal face' and in so doing will be well placed to identify further research ideas. T will also be opportunity for further data collection. A range of PhDs are possible for the doctoral fellow, using qualitative methodologies (primarily) depending on the preference and interests of the fellow, and to be agreed with the supervising team.

Training and development provision by host:
Formal training: The training plan will be informed by an analysis of the academic needs of the PhD candidate carried out in the first month. Training will be directed towards helping the candidate develop as an independent researcher, as well as towards the needs of the PhD project. The formal taught postgraduate research training programme at the University of Southampton includes epidemiology, statistics, research governance and study design. In addition, transferable skills courses are offered including Good Clinical Practice, time management, leadership, grant writing, and presentation skills. The

Conversation Analytic Data Sessions (CADSS) will also provide opportunity for training (this includes developmental sessions ran over a 10-week period). The Fellow will also be able to access free on-line masterclasses on systematic reviews and meta-analysis, research governance, ethics, patient and public involvement and engagement, developed by leaders in the SPCR. UCL offers opportunities to strengthen training through their various short course offerings.

Informal training:

The student will also be offered mentorship from a senior primary care academic (chosen depending on the candidate's interest/needs). Mentors receive formal training, developed by the Society for Academic Primary Care, to ensure independence and appropriate support. The Fellow will also have access to informal mentoring from senior members of the collaboration at an annual training meeting, and to participate in doctoral exchange programmes. In addition, a mentoring scheme which is available to doctoral candidates. Our REACH (Research Education Advice and Communication in Health ECR) group will also provide a programme of meetings which deal with key topics both practical and academic geared towards supporting researchers and students in their scholarly endeavours. UCL also offers opportunities to strengthen training through their various informal meetings for students / researchers interested in the study of interaction.

PPIE:

If funded, the PhD candidate would work with the supervisory team to recruit two public contributors to aid the design, execution and dissemination arising, outside of the primary output of a doctoral thesis. The student will also benefit from working with our strongly embedded PPIE team at the University of Southampton Primary Care Research Centre, and the Wessex Public Involvement Network.

Host department: Southampton (with University of Oxford)

Project Title:

Understanding wider health determinants in Multiple Long-Term Conditions (MLTC-M) using big data and artificial intelligence (AI).

Proposed supervisory team: **Names and areas of expertise to be included**

Dr Hajira Dambha-Miller (big data and epidemiology) Southampton
Professor Andrew Farmer (clinical and mixed methods expertise) Oxford

Potential for cross consortium networking and educational opportunities:

The project includes access to mid and senior-level researchers across three SPCR departments (Oxford, QMUL and Southampton) alongside external collaborators (Cambridge , Glasgow and Kent). The candidate will have access to leading experts in primary care, data science, epidemiology, statistics, AI and multimorbidity. The wider AIM team have a breath of methodological, subject and practical expertise to provide educational opportunities to the candidate. This will include 1:1 support and formal tutorials, in addition to networking opportunities through weekly cross-departmental AIM study meetings. There is also the opportunity for the candidate to network across the NIHR with monthly meetings across all the NIHR AIM funded PI's**.**

Project description:

BACKGROUND:

This PhD will be embedded within research funded by the **NIHR Artificial Intelligence (AI) programme** which utilises **AI** and **Big Data** to manage **multiple long-term conditions** (MLTC-M).

MLTC-M are increasingly prevalent and associated with high rates of morbidity, mortality and healthcare expenditure. Strategies to tackle this have primarily focused on addressing biological aspects of disease but MLTC-M are the result of and associated with additional psycho-social, economic and environmental barriers. A shift towards understanding these wider determinants of health could offer more holistic care solutions.

AIM:

- To use traditional epidemiological methods alongside AI pipelines to understand wider health determines in MLTC-M.

Methods:

We anticipate a mixed-methods PhD but this will be tailored to the candidate's interest with a particular focus on developing the AI and epidemiology skills within primary care big data. The team are using a number of datasets (CPRD, SAIL, ELSA and local social care data). The candidate can access these for cohort analysis with generated MLT-C clusters and trajectories characterised, and associations quantified in relation to clinical outcomes (e.g. incidence mortality, additional long-term conditions, disease severity and ten-year health care costs), using appropriate regression modelling.

Potential impact:

The work from this research will examine the utility of AI methods in health and social care research, and explore the methodology used to provide signals on intervention development and recommendations on targeted individual-level service delivery for managing MLT-C.

Training and development provision by host:

Formal training:

Bespoke training will be provided depending upon the learning needs and experience of the successful candidate. We anticipate specific training in statistics, big data processing/cleaning and epidemiology (using STATA to conduct descriptive analysis alongside Cox, Multivariable, Logistic modelling and Jupiter/R for more advanced AI skills). Training will be directed towards helping the candidate develop as an independent researcher, as well as towards the needs of the PhD project.

The formal taught postgraduate research training programme at the University of Southampton includes epidemiology, statistics, research governance and study design. In addition, transferable skills courses are offered including Good Clinical Practice, time management, leadership, grant writing, and presentation skills. The candidate on-line masterclasses on systematic reviews and meta-analysis, research governance, ethics, patient and public involvement and engagement, developed by leaders in the SPCR. The PhD will be awarded by the University of Southampton but as a key supervisor is based at the University of Oxford, we anticipate that the candidate will benefit from relevant training and expertise across both departments including the extensive SPCR and Wellcome PhD training programme .

Informal training:

The candidate will join our fortnight study meetings and be offered regular tutorials from supervisors and the wider study team who provide leading national expertise in AI, big data, epidemiology, statistics and subject expertise in big data. The candidate will also have access to informal mentoring from senior members of the collaboration at an annual training meeting, and to participate in doctoral exchange programmes.

PPIE:

We have PPI collaborators on the study team who the candidate will work with; this has helped us to ensure that our research is addressing public need and is feasible and acceptable to patients.

Host department: Southampton

Project Title:
NatRIDOShA: Natural Remedies: Support to Improve Diabetes Outcomes for South Asian communities

Proposed supervisory team:
• Dr Merlin Willcox (Clinical lecturer and GP, expertise in herbal medicine research) • Dr Ingrid Muller (Health psychologist, expert on person-based approach and qualitative methods) • Professor Michael Moore (Professor of primary care research, expertise in all aspects of primary care research) • Dr Shabana Cassambai (Research Associate, Centre for Ethnic Health Research, University of Leicester – expert on PPI with ethnically diverse groups)

Potential for cross consortium networking and educational opportunities:
This project will be run in collaboration with the University of Leicester's centre for ethnic health research.

Project description:
Aims 1.   To develop a culturally sensitive intervention for people in UK South Asian communities providing evidence-based information on effective natural remedies for type 2 diabetes. 2.   To pilot and optimise this intervention based on feedback from patients with type 2 diabetes from South Asian communities. **Project Plan** This project will build on our previous research, by developing and optimising an intervention for advising south Asian communities about effective use of natural remedies for T2DM. We will include two work packages: (1) Intervention development following theory-, evidence- and person-based approaches (2) Optimising the intervention through qualitative think-aloud interviews with our target group This proposal follows the expressed wish of people with T2DM for access to the evidence-base for natural remedies to support self-management. **Research plan/Methods** **Work package 1: Intervention development following theory-, evidence- and person-based approaches** Intervention planning will be informed by findings from a systematic review of qualitative studies to build an understanding of the views and experiences of natural remedies amongst people with T2DM and identify key needs and behavioural drivers to be addressed in the intervention. We will also develop guiding principles to inform the intervention development by highlighting the distinctive ways that the intervention design will address behavioural issues. A logic model will be developed and refined throughout intervention development to specify causal mechanisms through which the intervention is likely to result in behaviour change and trial outcomes. Intervention content and design will be developed alongside a PPI panel, clinicians, and researchers. **Work package 2: Optimisation of the intervention** Design: Qualitative study with think-aloud interviews

Sample: 25-30 people with T2DM from South Asian communities to enable feedback from a wide range of participants

Analysis/Outputs: We will conduct qualitative thematic analysis of the think-aloud interviews and will improve the booklet / website iteratively. The final output will be an intervention optimised for usability, feasibility and persuasiveness, ensuring it is meaningful, relevant, and engaging to the target population.

Training and development provision by host:

Formal training: The training plan will be informed by an analysis of the academic needs of the PhD candidate carried out in the first month. Training will be directed towards helping the candidate develop as an independent researcher, as well as towards the needs of the PhD project. The formal taught postgraduate research training programme at the University of Southampton includes epidemiology, statistics, research governance and study design. Transferable skills courses are also offered including Good Clinical Practice, time management, leadership, grant writing, and presentation skills. The Fellow will also be able to access free on-line masterclasses developed by leaders in the SPCR on systematic reviews and meta-analysis, research governance, ethics, patient and public involvement and engagement.

Informal training: The PhD candidate will receive mentorship and training from the supervisors and from other collaborators in the project at the Centre for Ethnic Health Research and from Dr Emma Redman, Senior Clinical Research Dietitian and Honorary Senior Lecturer, University of Leicester and NIHR Diet and Activity Research Translation Collaboration.

PPIE: MW was asked to work on this topic by people in the community where he works as a GP. Specifically, patients with diabetes asked for some support to know which natural remedies were effective. In preparation for the project, MW held three public engagement meetings with seven T2DM patients from ethnically diverse groups. The Centre for Ethnic Health Research (CEHR) at the University of Leicester also carried out a public engagement discussion group. We are working with the CEHR, to further engage members of the south Asian community. This engagement will be used to inform all project activities. The CEHR aims to reduce health inequalities locally and nationally by working with patients, the public, community and voluntary sectors, researchers, and health and social organisations They have community-based research staff who engage with seldom heard communities and inspire community-led research.

We will form a PPI panel to inform all stages of the project, including materials for recruiting participants. We will hold regular meetings throughout the project, and the PhD student will be able to attend these and gather the views of PPI members on all aspects of the PhD project.