3 Year PhD Studentship available for September 2019

Department:  Leicester Precision medicine Institute / Leicester Biomedical Research Centre / Cardiovascular Sciences

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Eligibility:  Available to UK/EU applicants only.

Project Title:  Redefining the NHS abdominal aortic aneurysm (AAA) screening strategy: Can targeted screening improve clinical and cost-effectiveness?

Project Description:

An abdominal aortic aneurysm (AAA) is a swelling of the main blood vessel in the body, the aorta. If an AAA gets to large it can burst (rupture) and cause dangerous internal bleeding. AAAs can easily be diagnosed with a simple ultrasound scan. In England, the NHS invites about 280,000 men for AAA screening each year. About 1 in 100 men who are screened are found to have an AAA. Much of the cost of AAA screening is spent on the 99% of men who do not have AAAs.

One alternative approach to AAA screening is to only invite men for screening if they are at high risk of having an AAA. This approach is used in the United States where only those men who are current or ex-smokers are invited for AAA screening. This reduces the number of men who are screened. It is not known if this approach misses many men with AAAs from the group who are not offered screening.

In this research we will analyse the results of the NHS AAA Screening Programme from the last 6 years. AAA screening outcomes will be combined with general practice records to see what would have happened if only men identified as smokers had been invited for AAA screening. This work will be extended to see if there are other risk factors in general practice records that can be used to identify men at high, or low risk of AAA. This information will be used to see if AAA screening can be targeted at groups of men who are at a high risk of having an AAA and, if so, whether such a targeted screening programme will still identify the majority of men with AAAs.
**Background:** Screening for AAA is both clinically and economically effective\(^1-^4\). The main determinant of this effectiveness is disease prevalence. AAA prevalence is decreasing over time\(^5\), steadily reducing the efficiency of the current NHS AAA Screening Programme (NAAASP) screening policy\(^6\). One alternative to whole population screening is targeted screening of high-risk groups such as smokers\(^7\). Whether this would detect a clinically and publicly acceptable proportion of disease, and whether it would improve cost-effectiveness is unknown\(^8-^10\).

**Proposed study:**

In this study we will 1) Assess the clinical outcomes of AAA screening targeted at men with established AAA risk factors such as smoking, including clinical outcomes in non-screened groups; 2) Develop an AAA risk prediction model based on primary care data and determine its use as a tool for targeted AAA screening; 3) Determine the cost-effectiveness of targeted AAA screening and compare this to whole population AAA screening.

**Hypothesis:** Can the effectiveness of Abdominal Aortic Aneurysm (AAA) screening be improved by targeting screening at individuals most likely to have an AAA, whilst ensuring that AAA detection rates remain acceptable to patients and the public?

**Experimental Methods and Research Plan:** A randomized trial to directly test targeted screening would be expensive and time consuming. Instead, using anonymized individual patient outcomes from the first six full years of the NAAASP (2013 to 2019, \(\approx1,700,000\) men, 1% with AAA) linked to national primary care data from NHS Digital (at least 87% of screening records) we will retrospectively apply targeted AAA screening strategies in-silico. In this cross-sectional cohort, the prevalence of disease in the targeted and non-targeted groups will be calculated. These outcomes will be used to populate a validated discrete event simulation model\(^11\) of AAA screening to determine the clinical and economic effectiveness of targeted screening. As well as examining targeted screening strategies based on established AAA risk factors, an AAA risk model will be developed using the linked dataset and tested as a tool for targeted screening.

NAAASP data from 2013 to 2019, and the June 2019 NHS Digital NHS Health Checks national GP data extract will be combined in the first year of this project to investigate targeted screening outcomes based on existing/putative targeted screening strategies and develop a predictive model to assess the risk. These data will be used to re-parameterise the AAA screening discrete event simulation model in the second/third years of the project.

We expect this project to have a direct and significant impact on NHS, UK and worldwide AAA screening policies.

**References:**

1. Cost effectiveness analysis of screening for abdominal aortic aneurysms based on four year results from randomised controlled trial. BMJ. 2002; 325: 1135.


**Funding details:**
This project is in competition for a LPMI/BRC College of Life Sciences (CLS) PhD Studentship. The Studentships are for three years, starting September 2019, and offer tuition fees at UK/EU rates and a Stipend at UK Research Council rates.

**Entry requirements:**
Applicants are required to hold/or expect to obtain a UK Bachelor Degree 2:1 or better in a relevant subject. The University of Leicester English language requirements apply where applicable.

**How to apply:**
You should submit your application using our online application system.

Apply for a PhD in Cardiovascular Sciences

In the funding section of the application please indicate you wish to be considered for a LPMI/BRC studentship.
In the proposal section please provide the name of the supervisor and project you want to be considered for.

You do not need to submit a proposal but please include a personal statement detailing your interest in this project.

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Closing date for applications 27th January 2019