



In this issue: Cost-effectiveness of new bowel cancer screening kits • Cost of blood transfusions • Chronic kidney disease and household income • Improving care in Alzheimer's Disease • Spotlight on Frauke Becker • New senior appointment • Latest staff news, recently funded projects, seminars, presentations and publications

This little test could help save your life.



New bowel cancer screening kits predicted to be highly cost-effective in England

Project team: Jacqueline Murphy, Alastair Gray

Through the NHS Bowel Cancer Screening Programme (NHS BCSP), men and women in England aged 60-74 years are invited for colorectal cancer screening every two years. The screening test currently used in England is the guaiac faecal occult blood test (gFOBT). However, several national screening programmes such as those in the Netherlands and Italy use an alternative test - the faecal immunochemical test (FIT) - which has been shown to have a higher sensitivity than gFOBT to detect potential cancers or pre-cancerous polyps in the bowel.

Patients with a positive screening test are followed up with diagnostic colonoscopy to determine whether or not treatment (such as removal of the polyp or cancer management) is required. Unlike gFOBT, the definition of a positive FIT test (or "threshold") can be selected, which enables a degree of control over the volume of demand for follow-up services.

We used decision modelling, combined with new evidence of the performance of FIT compared to gFOBT from a large population-level trial of FIT within the NHS BCSP, to estimate the lifetime screening, diagnostic and treatment requirements

for a population starting bowel screening at age 60 years. We performed a cost-effectiveness analysis comparing gFOBT with FIT in the English setting, and considered the results for several hypothetical FIT thresholds.

Our results suggest that FIT is dominant when compared with gFOBT at all thresholds, resulting in cost savings and QALYs gained over a lifetime time horizon. Greater health gains and cost savings were achieved at lower FIT thresholds due to savings in cancer management costs. However, at lower thresholds FIT was also associated with more colonoscopies; there was an estimated increased demand of 390 additional colonoscopies per 1000 people screened between the highest and lowest FIT thresholds considered. These results suggest that the threshold should be selected carefully so as not to overwhelm diagnostic services; one option would be a phased lowering of the threshold.

This work contributed to a national consultation on bowel screening, following which the National Screening Committee recommended that FIT should replace gFOBT in the NHS Bowel Cancer Screening Programme.

For more information: **HERC**



FIT...results in cost savings and QALYs gained over a lifetime time horizon



What does it cost to administer a blood transfusion in the UK?

Project team: Liz Stokes, Sarah Wordsworth

A blood transfusion is one of the most common procedures in hospitals, but the true cost of administering a transfusion is not known. The 2015 NICE guidelines on blood transfusion report the very limited UK data; the best estimates are based on just five observations at each of two hospitals in England in 2004, combined with more recent expert opinion and updated unit costs.

We undertook a detailed micro-costing study to estimate the costs of administering different blood products, through detailed measurement and valuation of resource inputs. Two key inputs into transfusion were costed: transfusion laboratory inputs for grouping



and issuing blood, and nursing inputs associated with blood samples for group and screens and administering blood. For each input, data collection forms were developed to capture staff time, equipment and consumables associated with each step in the transfusion process. Costing results were combined with costs of blood product wastage to calculate the cost per unit transfused for different blood products.

A total of 438 data collection forms were completed by 74 staff. The cost of administering blood was £49 per unit for red blood cells (RBCs), £58 for platelets, £38 for fresh frozen plasma (FFP) and £49 for cryoprecipitate. The costs of blood administration add substantially to the costs of the blood products themselves. For RBCs, costs are 40% higher when the costs of administration are added to the cost of RBCs; the cost of administering FFP exceeds the cost of the blood product itself. These are also frequently incurred costs; applying estimates to the blood components supplied to UK hospitals in 2015, the annual cost of blood administration, excluding blood products, exceeds £120 million. These cost estimates can be used in economic evaluations of blood transfusion strategies or healthcare alternatives that include transfusion to avoid introducing bias into results.

For more information: **HERC**



The costs of blood administration add substantially to the costs of the blood products themselves



Chronic kidney disease and household income

Project team: Bobby Mihaylova, Iryna Schlackow, Alastair Gray

Chronic kidney disease (CKD) causes disability and mortality and disproportionately affects socially disadvantaged people. This serious disease likely poses further financial strain on families both through increased costs for healthcare and reduced earnings. However, evidence for the impact of CKD on family income is sparse.

HERC researchers have recently collaborated with Rachael Morton (University of Sydney) and the Study of Heart and Renal Protection (SHARP) Investigators on a study of the impact of CKD on household income. In SHARP, a multinational study among participants with moderate to severe CKD, the household income of participants was measured at baseline and about five years later at the end of the study, and household poverty was defined as less than 50% of the median household income in the respective participant's country.

One third (32%) of the participants with CKD who provided two measures of household income, were in poverty at study baseline. Over the course of the study an additional 22% fell into poverty. Factors associated with a fall into poverty included black ethnicity, low educational attainment, a single adult household, a low starting household income and more advanced kidney disease. In both high and low to middle income countries there was a significant trend for a fall into poverty with more advanced CKD stage, with participants on dialysis at study baseline 1.8 times more likely to fall into poverty by study end than participants with moderate CKD. Participants who received a kidney transplant during the study had about half the risk of other participants with moderate to severe CKD.



Patients in advanced stages of chronic kidney disease are at an increased risk of falling into poverty



This study highlights the large proportion of patients with CKD who are in financial hardship, the increased risk of falling into poverty in advanced stages of CKD, and suggests that successful kidney transplantation may benefit not only the individual in terms of their health and quality of life, but also the economic stability of their household.

For more information: **HERC**

The ROADMAP project – an EU consortium to improve care in Alzheimer’s Disease

Project team: Filipa Landeiro, Alastair Gray, Katie Walsh, Helena Wace, Elsbeth Nye, Seher Mughal, Isaac Ghinai, Harriet Williams, Ravi Lukha, Jane Wolstenholme

Europe’s ageing population means more people with Alzheimer’s disease (AD). So far, progress in discovering disease-modifying interventions has been disappointing, and the burden on health and social care systems, and on informal carers, is increasing.



ROADMAP, ‘Real world Outcomes across the AD spectrum for better care: Multi-modal data Access Platform’, is a public-private consortium, funded by the EU, the European Federation of Pharmaceutical Industries and Associations, and Innovative Medicines Initiative. It is coordinated by the University of Oxford and Novartis, and involves several researchers from HERC. It aims to systematically explore real-world evidence, develop consensus on key measures of disease progression and outcomes across the full disease spectrum from earliest onset of symptoms to death, and establish guidelines on handling and interpreting this evidence. ROADMAP researchers will have access to an unprecedented quantity of data on dementia, including 75 national databases and clinical registries, over 40 cohorts and five dementia relevant trials.

The health economics work in Phase I of ROADMAP (2016 to 2018) is currently focused on completing three systematic literature reviews on economic models in AD, resources used and costs incurred by people with dementia, and quality of life of people with dementia. In addition, a workshop on economic modelling of AD interventions will take place in Paris in February 2018. Finally, we are collaborating with ROADMAP partners to define the key attributes and specifications of a new economic model spanning the disease spectrum, integrating information on disease progression, quality of life and resource use, and providing valid simulations over the life course. This model would be fully developed and validated in a future Phase II of ROADMAP.

ROADMAP provides unique opportunities to work across international boundaries, disciplines, and academic, public and industry partners. By extracting maximum information from existing real-world evidence, ROADMAP will provide a solid platform to better understand AD, and ultimately to develop more effective ways of preventing or slowing progression of this very challenging disease.

For more information:

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Senior appointment



We are delighted to announce that **Philip Clarke** will be taking up the position of Professor of Health Economics in HERC in 2018. Philip has an excellent research and publication record and a strong international reputation, as well as experience of building up and running an academic group both in Sydney and Melbourne. Philip is currently the Director of the Centre for Health Policy in the Melbourne School of Population and Global Health. His research interests align very well with HERC and with the Nuffield Department of Population Health, being global in scope, focused on chronic diseases including diabetes and cardiovascular disease, with strong interests in trial-based analyses, modelling, and use of big data, and covering evaluation, health policy and methodological research, including work on inequalities. Philip previously spent six years in HERC, during which time his research focused on the economic analysis of the UK Prospective Diabetes Study (UKPDS), a landmark trial of policies to improve the management of people with Type 2 diabetes. We look forward to Philip visiting this spring and formally joining HERC on 28th August.

HERC Seminars

Convenor: Brett Doble

HERC runs a series of seminars with invited speakers from the health economics community who talk on a wide range of applied and methodological topics.

In November, **Helen Vellekoop**, Researcher, Ghanaian Ministry of Health, Policy, Planning, Monitoring & Evaluation Directorate visited to present her work on: *Introducing rational healthcare prioritisation in Ghana: Methods and Challenges*.

In January, **Anna Heath**, a PhD student from the Department of Statistical Science at UCL came to HERC to present her work on: *Value of Sample Information as a Tool for Clinical Trial Design*.

Details of forthcoming talks can be found on the HERC website: <http://www.herc.ox.ac.uk>. To be added to our mailing list for future seminars, email us at herc@dph.ox.ac.uk

Spotlight on FRAUKE BECKER



I joined HERC as a Senior Researcher in May 2017 working on a number of diabetes projects. These include economic evaluations alongside large multinational or multicentre clinical trials in diabetic (EXSCEL trial) and pre-diabetic populations (ACE trial) to investigate the cost-effectiveness of (anti-) diabetic drugs in relation to diabetes and cardiovascular outcomes. Additionally, I have contributed to the ongoing teaching commitments of HERC.

My research background is in applied econometrics, economic evaluation and stated preferences. I received a PhD in Health Economics from the Health Economics Research Unit, University of Aberdeen, in 2013. My work there involved the economic analysis of dietary and physical activity

behaviours in relation to obesity. Since then, I have contributed to the health economics of two NICE diabetes guidelines (Diabetes in children and young people & Diabetes in pregnancy). Prior to my current appointment, I was based in the Health Economics Group at Newcastle University, where I was involved in a number of economic evaluations for public health interventions and conducted some preference elicitation work around financial incentives for health behaviour change using discrete choice experiments.

Over the last few months, I have thoroughly enjoyed the welcoming atmosphere at HERC, and the opportunity to develop new skills in economic evaluation with support from highly enthusiastic colleagues. I am very much looking forward to continuing my teaching and research activities within HERC and the Nuffield Department of Population Health.

Staff News – Welcome to:



Anish Adhikari is a foundation doctor on a 4-month rotation in HERC. He will be working with José Leal on the PROVE trial evaluating the cost-effectiveness of rehabilitation for osteoporotic vertebral fracture.



Harriet Williams is a 2nd year foundation doctor on a 4-month rotation in HERC. She will be working with Filipa Landeiro and Alastair Gray on the ROADMAP project, focussing on two systematic reviews investigating the economic cost of Alzheimer's disease and its impact on the quality of life of patients and caregivers.



Stephen Rocks joined HERC in February 2018 as a Researcher in Health Economics. He has a background in economics and expertise in mixed methods evaluation, having led on evaluations for organisations such as the British Heart Foundation and Macmillan Cancer Support. More recently he worked in an analytic role at Public Health England. Stephen is working with Apostolos Tsiachristas on an evaluation of different Child and Adolescent Mental Health Services.



We are pleased to welcome back **Claire Simons** who returned to HERC in January 2018 to work on a study of cost-effective monitoring strategies for people with chronic kidney disease in primary care alongside Bobby Mihaylova and Iryna Schlackow. Claire was an NIHR Research Methods Fellow in Health Economics at HERC between 2012 and 2014 working on decision modelling in cardiovascular disease prevention. Following this she developed her PhD on targeting and reducing uncertainty in cost-effectiveness analyses at the MRC Biostatistics Unit, University of Cambridge.

Congratulations to:



We are pleased to announce that **Bobby Mihaylova**, an Associate Professor and Senior Health Economist at HERC, has been appointed to the Chair of Health Economics post at Queen Mary University of London. Bobby started her new role at Queen Mary in January 2018 while also retaining part of her post at HERC to continue her ongoing research on cost-effective policies and treatments for cardiovascular disease prevention. We are glad that we are not saying a total farewell to Bobby, and would like to wish her every success in her new role!

Farewell to:



Peter Eibich, who joined HERC in early 2015, just as he was in the final stages of his PhD at the University of Hamburg. From the beginning Peter took an active role in HERC, revitalising our internal seminar series, while also working on two quite complex projects: MASTERMIND (concerned with variations in treatment response in Type 2 Diabetes), and ACHE (developing evidence based decision tools on who is most likely to benefit from hip or knee joint replacement surgery). In both cases Peter was able to bring his econometric skills to bear across a number of small, large and very large datasets, generating some very interesting results and pushing the work through to publication. In 2016 he was awarded a Wellcome Trust Society & Ethics Fellowship, allowing him to pursue his research on the demand for prevention in middle and later life. Although his work in that area will continue, Peter has now been offered and taken up an Associate Professorship in the Max Planck Institute for Demographic Research in Rostock; we are very sorry to see him leave HERC, but are also delighted at this recognition of his talents and wish him every success for the future.

Presentations by members of HERC

CDC, Division of Diabetes Translation

Atlanta, Georgia, October 2017

Alastair Gray

Diabetes Simulation Modelling: How far have we come? How much further to go?

Economic evaluation alongside surgical trials Workshop

Bristol, November 2017

Alastair Gray

What is different about economic evaluation of surgery RCTs? Issues with non-surgical comparators

A number of HERC researchers presented at the Annual Symposium of our department (the Nuffield Department of Population Health), held at the Saïd Business School in Oxford in January 2018.

5-by-5 Talks (5 slides in 5 minutes)

Apostolos Tsiachristas

Should I stay or should I go? A retrospective propensity score matched analysis using administrative data of alternatives to hospital admission for older people

Pengfei Zhu

Assessing Cardiovascular Risk in Chronic Kidney Disease

Speed Geeking (10-minute small group presentations)

Brett Doble

Secondary Care Costs for Rare, Undiagnosed, Suspected Genomic Conditions using Hospital Episode Statistics Data

Liz Stokes

Is a cardiac MRI beneficial after a cardiac event?: An economic assessment

International Genomics Festival

London, January 2018

Sarah Wordsworth

Reimbursing next generation sequencing technologies

Precision Medicine Network Meeting

Banff, Canada, February 2018

Sarah Wordsworth

A discussion of Precision Medicine and Value of Information Analysis

Matthew Little

Cost-effectiveness of the nocturnal use of a Temperature Controlled Laminar Airflow Device in the Laminar Airflow in Severe Asthma for Exacerbation Reduction trial

Muriel Levy

Trends in hospital care use in Harbin (2008-2015) using data from the China Kadoorie Biobank

Poster Presentations

Iryna Schlackow & Bobby Mihaylova (SHARP Collaborative Group)

A lifetime disease model based on an RCT: development, validation and applications

Iryna Schlackow, Alastair Gray & Bobby Mihaylova

Methods for temporal extrapolation from clinical trial data to inform economic evaluations: a taxonomy

Mara Violato & Alastair Gray

Estimating the quality of life impact of coeliac disease diagnosis using retrospective population self-reports

Liz Stokes & Sarah Wordsworth

A prospective study to estimate the full costs of administering blood transfusions in the UK

Publications

- Adams NL, Rose TC, et al. [includes **Violato M**]. *Relationship between socioeconomic status and gastrointestinal infections in developed countries: A systematic review and meta-analysis*. PLoS One. 2018. doi:10.1371/journal.pone.0191633
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- Doble B**, Payne R, Harshfield A, Wilson ECF. *A retrospective, multi-cohort analysis of the Clinical Practice Research Datalink (CPRD) to determine differences in the cost of medication wastage, dispensing fees and prescriber time of issuing either short (<60 day) or long (≥60 day) prescription lengths in primary care for common, chronic conditions in the United Kingdom*. BMJ Open. 2017. doi:10.1136/bmjopen-2017-019382
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- Landeiro F**, Wace H, et al. [includes **Ghinai I**, **Nye E**, **Mughal S**, **Walsh K**, **Wolstenholme J**, **Gray A**]. *Resource utilisation and costs in predementia and dementia: a systematic review protocol*. BMJ Open. 2018. doi:10.1136/bmjopen-2017-019060
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- Morton RL, **Schlackow I**, et al. [including **Gray A**, **Mihaylova B**] on behalf of the SHARP Collaborative Group. *Impact of chronic kidney disease on household income*. Kidney International Reports. 2017. doi:10.1016/j.ekir.2017.12.008
- Mostafa SA, Coleman RL, et al. [includes **Gray A**]. *Modelling incremental benefits on complications rates when targeting lower HbA1c levels in people with Type 2 diabetes and cardiovascular disease*. Diabetic Medicine. 2018. 35:72-77. doi:10.1111/dme.13533
- Tsiachristas A**, van Ginneken E, Rijken M. *Tackling the challenge of multi-morbidity: Actions for health policy and research*. Health Policy. 2017. doi:10.1016/j.healthpol.2017.11.011
- Niño-Zarazúa M, **Roope L**, Tarp F. *Global Inequality: Relatively Lower, Absolutely Higher*. Review of Income and Wealth. 2017. doi:10.1111/roiw.12240
- Stokes EA**, **Wordsworth S**, et al. *Accurate costs of blood transfusion: a micro-costing of administering blood products in the United Kingdom National Health Service*. Transfusion. 2018. doi:10.1111/trf.14493
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