Following large increases in the prevalence of overweight and obesity in recent decades, more than 60% of adults in Western populations including the UK are overweight or obese. Excess weight is a leading cause of death and disability globally, and is also contributing to the increased pressures on healthcare services.

HERC researchers have recently collaborated with colleagues in the Cancer Epidemiology Unit and Nuffield Department of Primary Care Health Services to investigate the impact of excess weight on the use and costs of primary care services in England. We analysed the primary care records over six years of 70,000 women in England aged 55-79 years who participated in the Million Women Study, comparing the use and costs of primary healthcare services between women at different levels of body mass index (BMI), while controlling for other observed differences such as smoking behaviour and level of socioeconomic deprivation.

We found that each 5kg of extra weight above a BMI of 20kg/m² was associated with 5% more consultation costs and 10% more medication costs. Diagnostic and monitoring costs were similar irrespective of weight. Extrapolating these results to all women aged 55-79 years in England, we estimated that 11% (£229 million) of primary care consultation costs and 20% (£384 million) of prescription medication costs were due to overweight or obesity. The excess medication costs were predominantly due to treatments for diabetes, cardiovascular disease and pain management.

Our results quantify the substantial impact of excess weight on the use and costs of primary healthcare services and underscore the need for greater investment in cost-effective interventions to reduce weight or prevent weight gain.

For more information:
Increasing efficiency in the English diabetic retinopathy screening programme

**Project team:** Ramón Luengo-Fernández, José Leal

Diabetic retinopathy (DR) is an important cause of blindness in the working age population in the UK, with diabetic macular oedema (DMO) being one of its complications. Screening for DR and DMO using retinal photography has been shown to be cost-effective. Treatment options for DMO include macular laser treatment or anti-vascular endothelial growth factor (VEGF) injections, however, treatment is only recommended for patients with clinically significant macular oedema (CSMO), with non-CSMO patients deriving little additional benefit from treatment.

Under the screening programme, patients with early stage DR and suspected DMO are referred to hospital eye services, with a large proportion deriving no benefit due to absence of CSMO. Spectral Domain Optical Coherence Tomography (SD-OCT) produces three-dimensional images of the eye. It could relieve pressure on NHS services by correctly identifying those patients who are screen positive for DMO but do not have CSMO, limiting the number of referrals to hospitals. HERC researchers have recently investigated whether the addition of SD-OCT imaging to the screening pathway is cost-effective compared to hospital eye service follow-up.

Using a Markov model we simulated the progression of individuals with early stage DR and DMO following DR screening over 12 months. The model was informed by patient-level data from the Gloucestershire Diabetic Eye Screening Service linked to the local digital surveillance programme and hospital eye service follow-up between 2012 and 2015.

For patients with early stage DR and DMO following DR screening, assessment using SD-OCT was found to be cost-saving when compared to the hospital eye service pathway. These savings, estimated at £70 (95% CI: £70 to £81) per patient, were driven by the fact that 80% of patients did not require referral to the hospital eye service, so could be safely monitored at an SD-OCT follow-up clinic or discharged back to screening.

This was the first study to show that the use of SD-OCT in the digital surveillance pathway of the English NHS Diabetic Eye Screening Programme is both effective and cost-effective.

For more information:
Comparing methods for analysing partial factorial trials

**Project team:** Helen Dakin, Alastair Gray

Partial factorial trials compare two or more pairs of treatments on overlapping patient groups, randomising some (but not all) patients to more than one comparison. For example, some patients may be randomised to drug A or its placebo, others randomised to drug B or its placebo (illustrated for a hypothetical trial in the table below), and further patients randomised simultaneously to A or its placebo and to B or its placebo. Although the design has been used in several high-profile trials, including the United Kingdom Prospective Diabetes Study and the Women’s Health Initiative, analysing this type of study raises additional challenges for health economists and there has been little or no previous research on the best way to analyse the results.

The Knee Arthroplasty Trial (KAT) is a partial factorial randomised trial comparing three aspects of knee replacement design: bearing (mobile versus fixed), backing (metal versus solid polyethylene) and patella (resurfacing versus no resurfacing). HERC researchers compared four different methods for analysing the KAT study:

1. Ignoring interactions and analysing the trial “at-the-margins”.
2. Focusing on the patients randomised to more than one comparison “inside-the-table”.
3. Using the “Bayesian bootstrap” to estimate interactions while analysing data from all patients.
4. Analysing the entire trial population “as treated”.

We observed interactions between the different types of knee replacement being compared in KAT and found that both standard errors and the treatment providing best value for money differed between the four analyses.

We concluded that researchers analysing partial factorial trials should explore interactions and test whether the results are sensitive to the methods used. At-the-margins may give a useful indication of average results if interactions are negligible or if the proportion of patients receiving different treatments is very similar to routine clinical practice, but may be misleading in other situations. The Bayesian bootstrap provides a useful way to allow for interactions while making use of the whole sample. This could be used for analyses of clinical endpoints or economic evaluations.

For more information: HERC

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**Hypothetical partial factorial trial (n=400)**

<table>
<thead>
<tr>
<th>Randomised in Comparison B</th>
<th>Not randomised in Comparison B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo of A</td>
<td>Drug A</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>Drug B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>Did not have B</td>
<td>Received B</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>130</td>
</tr>
</tbody>
</table>

...researchers analysing partial factorial trials should explore interactions and test whether the results are sensitive to the methods used

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**Spotlight on PATRICK FAHR**

I joined HERC and the University of Oxford as a DPhil student in October 2017 to undertake research on the economics of genomic medicine. Supervised by Sarah Wordsworth and James Buchanan, the focus of my thesis will be on economic evaluations of next-generation sequencing (NGS) technologies in rare disease diagnostics using big data from the 100,000 Genomes Project. The 100,000 Genomes Project was set up by Genomics England with the principle objective to sequence 100,000 whole genomes from patients that suffer from rare diseases and cancer. Scientific discoveries generated from this project will subsequently support the successful implementation of genomic medicine in the NHS. My main interest lies in understanding the costs involved when patients with rare genetic disorders follow long diagnostic odysseys with predominantly meagre diagnostic success rates. Additionally, I am interested in the usability of linked datasets such as routinely collected health data and genomic data in economic evaluations of NGS technologies.

Prior to joining HERC, I was part of a market access team at a contract research organisation within the pharmaceutical industry, living in Mexico City and working across Latin America. Before that, I undertook an MSc in Public Policy and Human Development at the United Nations University / Maastricht University, The Netherlands. Living in Oxford now, I cannot put into words how much I have so far appreciated the City of Oxford, the University of Oxford and the Nuffield Department of Population Health / HERC. My social highlight so far has been the unofficial HERC trip to Snowdonia – sleeping with ten people in an old, cold and very dirty barn was so much fun! I am very much looking forward to at least two more years at HERC.
**Staff News – Welcome to:**

**Koen Poulves,** who joined HERC in January 2019 as a Senior Researcher from Nuffield Department of Population Health, University of Oxford with a forum to present current research and discuss future collaborations, for the organisation of the UK Health Economists’ Study Group (HESG) meeting, which is likely to be held in Oxford in summer of 2020.

If you are interested in participating in this workshop, please contact Philip Clarke (philip.clarke@ndph.ox.ac.uk) or Laurence Roope (laurence.roope@ndph.ox.ac.uk). For more general enquiries please contact the workshop organizers.

Further details will be available on our website soon.

**Oxford Health Economics Workshop 2019**

HERC is hosting a University-wide health economics workshop on the challenge of antibiotic resistance on Thursday 25th March 2019 at the University of Oxford Old Road Campus in Headington. The workshop will provide economists and health economists from across Oxford with a forum to present current research and discuss future collaborations, for the organisation of the UK Health Economists’ Study Group (HESG) meeting, which is likely to be held in Oxford in summer of 2020.

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**Presentations**

4th Annual Primary Care Research Symposium
Nuffield Department of Population Health, University of Oxford
Thursday 25th March 2019

**Health Economists’ Study Group**

**Division of Epidemiology and Public Health Seminar Series**

University of Nottingham, February 2019

**Mara Violato**

The impact of diagnosis on health-related quality of life and costs in people with coeliac disease: a UK population-based longitudinal panel study.

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**Centre for Health Economics Seminar**

University of York, February 2019

**Philip Climent**

The origins of health economic evaluation

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**Recent Publications**


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**HERC Seminars**

**Convenor: Stephen Rocks**

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

In November, **Dr Guido Erreygers**, Professor of Economics at the Faculty of Business & Economics, University of Antwerp, was invited to HERC to present his research on: *A Direct Regression Approach to Decomposing Socioeconomic Inequality of Health.*

In December, **Dr Tommi Tervonen**, Research Scientist and Consultant at Eviverta, London, visited HERC to present his work on: *Multi-Criteria Decision Analysis for Comparative Value Assessment.*

In February, **Dr Dan Howdon**, Senior Research Fellow in Health Economics, Leeds University visited and presented his work on: *Implications of non-randomised budgetary impacts in health technology assessment.*

Details of forthcoming talks can be found on the HERC website: [http://www.herc.ox.ac.uk](http://www.herc.ox.ac.uk). To be added to our mailing list, future seminars, email us at [herc@ndph.ox.ac.uk](mailto:herc@ndph.ox.ac.uk).