Virtual launch of the UK Prospective Diabetes Study (UKPDS) Outcomes Model Version 2.1

HERC project team: Helen Dakin, Philip Clarke, José Leal, Teresa Day, Barbara Kitchener

On 6th July, the latest version of the UK Prospective Diabetes Study (UKPDS) Outcomes Model was officially launched in an interactive webinar attended by 71 researchers from academic, government and commercial organisations around the world.

The UKPDS Outcomes Model is a computer simulation model developed by researchers at HERC and the Diabetes Trials Unit that predicts clinical events, life expectancy, costs and QALYs over a lifetime for populations with type 2 diabetes. The model is available through Oxford University Innovation, with no charge to non-commercial users and has been used by hundreds of people around the world.

The latest version (2.1) provides greater speed and additional features and outputs. Users can now compare up to 25 treatment groups, enabling comparisons against multiple comparators in health technology assessment. Users can define up to five composite endpoints to match trial endpoints and/or the outcomes of interest to decision-makers. Outputs can also be customised to minimise processing time and match the user’s requirements. New output options facilitate subgroup analyses and handling uncertainty.

As part of the webinar, Philip Clarke, Rury Holman and Amanda Adler provided an introduction to the model and how it can be used in clinical trials and health technology assessment. Helen Dakin provided an overview of how to use the model and demonstrated the latest version, while James Groves demonstrated how to licence a copy of the model. Attendees were from Australia, USA, India and Europe, reflecting the international use of the model. Around a third of 29% of attendees currently use the model. A recording of the event is now available at https://youtu.be/4G2i-UMbNJQ.

For more information:
https://process.innovation.ox.ac.uk/software/p/9965/ukpds-outcomes-model-non-commercial/1
R for HTA Consortium

HERC project team: Iryna Schlackow, Claire Williams, Boby Mihaylova, on behalf of the R for HTA Scientific Committee

R is a freely available programming language used for statistical analyses. It has been growing in popularity in health sciences due to its efficiency, flexibility and superb graphical capabilities. Resources have been developed for health economists and HTA analysts, e.g. packages on Bayesian cost-effectiveness analysis, Markov modelling and value of information. Detailed documentation, open source software, friendly R community, numerous training resources – these ensure that people at all levels can make use of the most recent developments and produce efficient and reproducible research.

In 2018, the R for Health Technology Assessment (R for HTA) academic consortium was established to explore how R, and statistical software in general, could be integrated into the process of developing health economic evaluations. Our scientific committee is led by Gianluca Baio (University College London) and Howard Thom (University of Bristol) and consists of 11 members based in the UK and Ireland, including Iryna Schlackow, Claire Williams and Boby Mihaylova. Our members have extensive experience with academia, industry, NICE and governments worldwide, regularly present at conferences, publish methodological and tutorial papers and facilitate discussions across a range of technical aspects.

We also run regular events for health economists including short courses and summer schools, workshops and hackathons. Many of these are informal, with everyone from complete novices to advanced users welcome. In particular, we will hold our next annual R for HTA Showcase virtually on October 9 and October 12. We have an excellent string of speakers, including several current and former HERC members (Mi Jun Kang, Iryna Schlackow, Claire Simons and Seamus Kent), and a panel discussion involving representatives from academia, consultancy, NICE and industry. Please visit our website to find out more about our activities, and follow us on Twitter (@rhta16).

For more information: https://rhta.org/

Reducing requests for antibiotics in primary care

HERC project team: Laurence Roope, Koen Pouwels, Sarah Wordsworth

Taking antibiotics when they are not required is a major public health concern, because it enables bacteria to resist antibiotic treatment. This means that, increasingly, we may not be able to find antibiotics that can cure serious infections.

About 50% of all antibiotic prescribing in primary care is for respiratory-tract infections, such as influenza-like illnesses. Much of this prescribing is not necessary, and previous studies have found that doctors sometimes make such prescriptions because they perceive that their patients want them.

To reduce patient requests for unnecessary antibiotics, public health campaigns often provide fear-based information about antibiotic resistance. However, research has shown that fear-based campaigns in other contexts, such as smoking and alcohol abuse, are likely to be ineffective, and can even backfire, unless people feel confident they can carry out the recommended behaviour. We hypothesised that this principle also applies to the effectiveness of fear-based information aimed at discouraging people from requesting antibiotics.

To test our hypothesis, we surveyed two waves of 4,000 members of the UK public, who were randomised to receive different messages about antibiotic-use and resistance. Working closely with behavioural scientists, we designed messages both with and without ‘empowering information’ on how to effectively self-manage influenza-like symptoms without antibiotics.

The results – recently published in BMC Medicine – confirmed our hypothesis. We found that messages warning of the dangers of antibiotic resistance could help to reduce requests for antibiotics, but they were much more effective when combined with messages empowering patients to self-manage symptoms effectively without antibiotics. Including the empowerment message was found to be particularly important for encouraging people with low awareness of antibiotic resistance not to ask for antibiotics.

We believe that this finding has important implications for the design of future public campaigns intended to reduce antibiotic use, and possibly for campaigns in other areas of public health where information is provided to the general public.

For more information: https://doi.org/10.1186/s12916-020-01553-6
Accurately reflecting uncertainty in patient-level simulation models

**HERC project team:** Helen Dakin, José Leal, Philip Clarke, Alastair Gray

Patient-level simulation models are increasingly used to extrapolate data from clinical trials since they allow for heterogeneity, patients’ history and non-linear relationships between patient characteristics and model outputs. However, there has been little research on how to estimate 95% confidence intervals that combine sampling uncertainty around the trial sample within the trial period and during the extrapolation, with parameter uncertainty around the model parameters used in the extrapolation.

HERC researchers have developed and tested new methods for combining different types of uncertainty and accurately reflecting precision within patient-level simulation models extrapolating data for trial participants, and the results of this work were recently published in *Medical Decision Making.*

We developed methods for combining parameter and sampling uncertainty; analytical formulae based on Rubin’s rule; summing variances; Rubin’s rule regression with/without covariates, and bootstrapping from the trial sample. We compared these methods using a simulation study based on an economic evaluation extrapolating the AFORRD randomised trial using the UK Prospective Diabetes Study Outcomes Model (UKPDS-OM). This demonstrated that ignoring sampling uncertainty gave confidence intervals that were too narrow, while all four methods that combined parameter and sampling uncertainty gave similar results with 96% coverage (see figure).

We also demonstrated the importance of adjusting for pre-randomisation variables that may be imbalanced between randomised groups: particularly in small trials extrapolated using patient-level simulation models. In our study, adjusting for baseline characteristics increased precision and had a small effect on point estimates. Baseline imbalance in variables such as age, gender, morbidity and pre-randomisation costs could also introduce bias for within-trial outcomes that are correlated with baseline characteristics, such as costs and QALYs.

For more information: https://doi.org/10.1177/0272989X20916442

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**HERC Short Courses**

HERC is running two short online courses in health economics this autumn.

**NEW COURSE** Integrating economic evaluation into clinical trials, 8th-9th December. This course, for those working in clinical trials, will give participants an understanding of what is required to design and conduct an economic evaluation alongside a clinical trial.

**Applied Methods of Cost-Effectiveness Analysis:** Registration is now open for the next course, taking place between 16th - 20th November.

For further information on both courses, please click here.

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**Inaugural lecture: Philip Clarke**

The inaugural lecture of Professor Philip Clarke, Director of HERC, is now available to watch on the NDPH Youtube channel here.

This lecture, titled “Tackling diabetes in the 21st century — an economic road map”, is a wide ranging talk that touches on the economics of diabetes and of maps.

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**Spotlight on John Buckell**

I joined HERC in May 2019 to work mainly on projects related to genomics and obesity. On the obesity side, HERC collaborates with the Health Behaviours team in the Nuffield Department of Primary Health Care Sciences. Here, we are studying the relationship between individuals’ BMI and their Health-Related Quality of Life. This is an important topic, as valuations of this relationship feed into clinical commissioning decisions, which potentially affect many people with overweight or obesity. We are using data from large-scale randomised controlled trials, which we combine in joint analyses (an individual patient data meta-analysis). I am also working on projects where we are investigating behaviour related to shopping choices, price promotions and food labels.

On the genomics side, HERC is collaborating with researchers in Canada to value genomics-based healthcare for children with rare diseases. We are trying to understand if it makes economic sense to roll out genomic testing programs to help diagnose these conditions earlier along patients’ clinical pathways. We are using data from the 100,000 Genomes Project, together with hospital data, to look at costs for our population of interest. We are also conducting discrete choice experiments to study parents’ preferences for the genomic testing of their children, which will feed into economic evaluations.

Away from genomics and obesity, I am involved with researchers at HERC in promoting open science practices in health economics. For example, we are petitioning for the use of Registered Reports as a mechanism for peer review. I am also part of exciting special interest research groups across the university, covering topics such as discrete choice experiments/choice modelling, reproducible science, obesity, health psychology and tobacco.

Prior to joining HERC, I was at the Yale School of Public Health where I used experimental and quasi-experimental approaches to study tobacco behaviours. I gained my PhD at the University of Leeds in 2015 where I studied hospital efficiency using “frontier techniques”.”
This work will estimate the cost-effectiveness of the current approach to lung cancer screening versus the described national programme to improve the diagnosis of lung cancer industry have recently invested more than £11 million in the UK. This investigation is being undertaken at the Nuffield Department of Population Health, as part of the Oxford Centre for Clinical Practice and Patient-Centred Care (PCC) and other thoracic diseases. As part of this work, funding from UK Research and Innovation, Cancer Research UK and the NIHR Applied Research Collaboration for Oxford and the Thames Valley to investigate the impact of COVID-19 on the quality of life of children and adolescents, as well as educational (for children) and productivity (for parents) losses throughout the COVID-19 pandemic in the UK. 

**Funding**

UK Research and Innovation, Cancer Research UK and industry have recently invested more than £11 million in an Oxford-led artificial intelligence (AI) research programme to improve the diagnosis of lung cancer and other thoracic diseases. As part of this work, Sarah Wordsworth will co-lead a work package on Primary care, Population Health and Health Economics modelling, along with Professor Julia Hippisley-Cox (Primary care, Population Health and Health Economics) at the London School of Economics and Political Science. As part of his course, he is undertaking a summer placement at HERC, during which time he will write a dissertation under the supervision of Philip Clarke and Laurence Roope.

**Recent Publications**


