‘Big data’ is an increasingly popular term used to refer to the collection and analysis of large, complex datasets, often in subject areas that are relevant to health economists, such as population health or genomics. There is a perception that big data is a recent development, but in fact researchers have been working on big data projects for many years.

Since 2001, HERC researchers have been collaborating with trialists, epidemiologists and statisticians at the Clinical Trials Service Unit (CTSU), University of Oxford on economic analyses in a number of large cardiovascular trials. The good quality data available from large streamlined randomised studies (or mega-trials) enables health economists to address research questions such as “Do intervention effects on a range of outcomes differ in categories of participants?” “What are the likely long-term effects of interventions?” and “For whom are interventions effective and cost-effective?”. Mega-trials can also inform assessment of effects of socioeconomic, behavioural, disease risk factors and disease events on future health outcomes and healthcare resources, and guide implementation of healthcare interventions.

The economic studies in the 20,536-large Heart Protection Study (HPS), 9,270-large Study of Heart and Renal Protection (SHARP) and the 25,000-large Treatment of HDL to Reduce the Incidence of Vascular Events (HPS2-THRIVE) study have shown that large trials can reliably inform models of effects of serious disease events on quality of life and healthcare costs, as well as the development of long-term disease models. The lifetime disease models for people at high cardiovascular risk (HPS) and people with chronic kidney disease (SHARP), confirm that longitudinal health event data is important in estimating the interdependence between adverse events and over time to estimate long-term quality-adjusted survival and costs. Our cost-effectiveness analyses in the HPS and SHARP studies also underlined the importance of multivariate cardiovascular risk in determining absolute benefits and cost-effectiveness of cardiovascular preventive interventions. Further work using the 175,000-large Cholesterol Trialists’ Collaboration meta-analysis of 27 large statin trials showed reliably that statins are beneficial also at low cardiovascular disease risk.

This programme of work is thriving at HERC. Future projects are planned alongside new mega-trials which will address a larger range of questions and make full use of the expertise accumulated while working with big data over the past decade.

For more information:
HERC expands portfolio of discrete choice experiment research

Project team: James Buchanan, Helen Campbell, Alastair Gray, Rachael Morton, Laurence Roope, Sarah Wordsworth

HERC has recently experienced a rapid expansion of our portfolio of research into the elicitation of patient and clinician preferences for healthcare interventions using discrete choice experiments (DCEs). DCEs provide information about what is important to patients and health care providers, which can enhance clinical decision-making and support policies to maximise benefit to society as a whole. DCEs also provide a mechanism for estimating the monetary willingness to pay for different alternatives, which can be used in cost-benefit analysis. However, DCEs do have limitations as a stated preference technique; they can be open to ‘hypothetical bias’ i.e. what is measured is what respondents say they will choose, not necessarily what they actually choose. Within our portfolio of DCE research we aim to tackle a number of these challenges. Topics of particular methodological interest are outlined below.

DCE

Use of DCE trade-offs to populate decision analytic models

A series of economic decision models are being designed to explore the costs and effects of alternative antibiotic prescribing patterns in relation to patterns of antimicrobial resistance, in the context of both hospitals and primary care. Laurence Roope and Sarah Wordsworth are leading DCEs among patients and clinicians that will identify trade-offs between current and future actions and outcomes. It is hoped that this analysis will ultimately inform the development of behavioural interventions designed to curb excessive antibiotic use. This study is funded by NIHR Health Protection Research Unit and Public Health England.

Exploration of attribute non-attendance

Some DCEs require numerous attributes to be included to preserve face validity; however, the inclusion of too many attributes may increase the complexity of the choice task. In addition, the inclusion of attributes that are consistently ignored leads to biased coefficients, due to non-compensatory behaviour. Rachael Morton is conducting a DCE among nephrologists where the proposed alternatives are patients, described using 10 different attributes. At the end of the choice sets, the respondents are asked whether they ignored any attributes, and if so which ones. The effect of attribute non-attendance on the overall results of the DCE will be explored using latent class models. This study is being undertaken in collaboration with the George Institute and The University of Sydney.

Risk presentation methods

Although the number of published DCE studies has increased recently over the past few years, a key challenge to maintaining this momentum is that DCE respondents are increasingly being asked to evaluate complex risk information (including probabilities, frequencies and percentages). It is well known that the general public struggle with concepts of probability and uncertainty, and if respondents misinterpret (or ignore) risk information then this may invalidate WTP values generated using their preferences. James Buchanan and Sarah Wordsworth are currently conducting a DCE in the area of genomic testing in which graphical risk presentation techniques are compared with frequency statements to assess the extent to which this impacts on preferences and WTP.

Mount Hood 2014 Challenge Meeting

The Mount Hood 2014 Challenge Meeting was held in June at the University of Stanford, USA. The meeting provided a forum for computer modellers of diabetes to discuss and compare models via three different challenges: 1) external validation of the Look AHEAD study results; 2) external validation of mortality data from the Swedish National Diabetes Register data and 3) cross-model variation in model outcomes as a result of ethnicity. José Leal and Alastair Gray were part of a team representing the UKPDS Outcomes Model group. This computer simulation model is based on patient data from the UK.

Prospective Diabetes Study and José Leal

Prospective Diabetes Study and can be used to forecast the likely occurrence of major diabetes-related complications and death in patients with Type 2 Diabetes Mellitus. The validation results of versions 1 and 2 of the model were presented at the meeting. Alastair and José also chaired several sessions and participated actively in the ensuing discussions. A paper is now being written relating the results of the meeting. Finally, the meeting was preceded by a one-day workshop titled ‘Diabetes Modelling Masterclass’, where José delivered a presentation on ‘Techniques for model validation’.
In September 2013, the NIHR funded Diagnostic Evidence Co-operatives (DECs) in four locations in England with the aim of improving the way that diseases are diagnosed by the NHS. The focus of the Oxford University based DEC is on identifying, evaluating and implementing in-vitro diagnostics (IVDs) in primary care settings. A strong multi-disciplinary team has been assembled, including primary care clinicians, diagnostic test researchers, industry, NHS laboratory services, commissioners and the NICE diagnostics programme. HERC senior researcher, Jane Wolstenholme, is leading the health economics component of this work.

One of the components of the DEC in Oxford is the Oxford Diagnostic Horizon Scan Programme. This aims to identify new and emerging diagnostic technologies relevant to primary care in the NHS that are likely to have a significant impact, summarise the current evidence base for these technologies (including health economic evidence) and assess their likely impact on health and health care. The main outputs from the Horizon Scan Programme are technology reports, systematic reviews and health economic assessments, but in some cases pilot studies of new technologies in primary care settings are also conducted.

To date, 32 reports have been published, on a wide variety of topics ranging from iPhone/iPad related medical devices to non-contact infrared thermometers to dermoscopy for the diagnosis of melanoma in primary care. These reports are freely accessible online and are disseminated to the NIHR Health Technology Assessment Programme (HTA), NICE and commissioners of health care services.

Future work will include economic modelling alongside studies conducted within the remit of national cancer screening programmes (the NHS Cervical Screening Programme and the NHS Bowel Cancer Screening Programme). Previous project involvement (prior to joining HERC) in the area of liver cancer and related disease pathways prompted an interest in disease modelling in cancer, so I look forward to expanding my experience in this broad area through these projects.

Over the past two years I have enjoyed the welcoming atmosphere at HERC and the opportunity to gain insights into the research being conducted in the wider Nuffield Department of Population Health, such as in the fields of epidemiology and medical statistics. I am keen to continue increasing my skills and experience with a view to starting doctoral research in the near future.

For more information: www.oxford.dec.nihr.ac.uk/
Recent Funded

Partial Prostate Ablation versus Radical Prostatectomy (PART). This is a feasibility study which will run until Feb 2015 and is funded by the HTA. Economic analysis is led by Jane Wolstenholme.

Video assisted thoracoscopic lobectomy versus conventional Open Lobectomy for lung cancer, a multi-centre randomised controlled trial with an internal pilot. The VIOLET Study. This is a 5 year study, funded by NIHR HTA, which will compare the effectiveness, cost-effectiveness and acceptability of video assisted thoracoscopic surgery (VATS) lobectomy versus open surgery for treatment of lung cancer. Economic analysis led by Sarah Wordsworth.

Airways 2: Emergency Respiratory Treatments. Funded by NIHR HTA. Out of hospital cardiac arrest (OHCA) is common, but survival rates are low. This 5 year study will investigate interventions which improve OHCA outcomes, and the substantial uncertainty regarding the best initial airway management. Economic analysis led by Sarah Wordsworth.

Presentations by members of HERC

Nuffield Department of Population Health, University of Oxford, Work in Progress Seminars Oxford, May 2014

Helen Dakin
Economic evaluation of factorial randomised controlled trials

NIMAST/UKSF Northern Ireland Stroke Conference 2014, Belfast, May 2014

Ramón Luengo-Fernandez
Population-based study of acute and long-term care costs after stroke in patients with AF

Public Health Thames Valley Service Academic Partnership, inaugural network meeting Oxford, May 2014

Sarah Wordsworth gave a presentation on the work carried out by HERC.

London School of Economics

Ingrid Slade
The Philosophy of Personalised Medicine

National Cancer Intelligence Network Conference Barry Islands, June 2014

Richdal Burns
A Cost-Effectiveness Analysis of PSA testing for the secondary prevention of Prostate Cancer in the Republic of Ireland

British Society of Haematology Annual Meeting, Poster presentation Manchester, June 2014

Liz Stokes
Healthcare costs and quality of life associated with acute upper gastrointestinal bleeding in the UK

Selected Publications


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