Healthcare costs and body mass index

Project team: Seamus Kent, Boby Mihaylova, Alastair Gray, Francesco Fusco

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 expected to increase healthcare expenditure.

In collaboration with researchers from the Cancer Epidemiology Unit and Nuffield Department of Primary Care Health Services, we undertook a systematic review, published in Obesity Reviews, of studies using individual participant data to estimate the impact of body mass index on healthcare costs. Compared to healthy weight individuals, overweight and obese individuals had 12% and 36% higher total annual healthcare costs, respectively. These associations were strongest for medications, followed by inpatient care, and ambulatory care. Most studies used data from the USA, and were based on small-to-moderate numbers of participants.

In a second study, published in the Lancet Public Health, we analysed hospital admissions of over 1 million women in England aged 55-79 years (the Million Women Study). The rate of admissions ranged from 320 per 1,000 person-years, at an annual cost of £570 per person for those at healthy weight, to 530 admissions per 1,000 person-years and an annual cost of £1,220 for women with severe obesity. Every 5kg increase in weight is associated with a 5.2% increase in annual admissions and 7.4% increase in annual costs.

Among all women aged 55-79 years in England, 15% (£662 million) of hospital costs was due to overweight or obesity. 40% of these excess costs were due to musculoskeletal conditions, in particular knee replacement surgeries for women with osteoarthritis. Diabetes, circulatory and digestive system diseases, and cancers also contributed significantly.

These results highlight the healthcare services where excess weight is likely to have the greatest impact, and may be useful for policy making and commissioning. The results underscore the need for greater investment in cost-effective interventions to reduce weight or prevent weight gain.

For more information: HERC

"Every 5kg increase in weight is associated with a 5.2% increase in annual admissions and 7.4% increase in annual costs"
A key challenge is that interactions may occur more commonly for costs and QALYs than for clinical endpoints.
Is it cost-effective to use genomic information to guide treatment decisions?

**Project team:** James Buchanan, Sarah Wordsworth

Genomic testing hit the headlines earlier this summer when it was the subject of the NHS England Chief Medical Officer's annual report ("Generation Genome"). Genomic tests can simultaneously scrutinise multiple genes and their inter-relationships and may improve the stratification of patients to receive new therapies, compared to genetic tests that are targeted solely at specific genes of interest. However, the use of expensive targeted therapies can impact on the cost-effectiveness of these tests.

HERC researchers, together with clinical and scientific collaborators in Oxford, have recently completed an economic evaluation of the use of genomic testing to guide ibrutinib treatment decisions in chronic lymphocytic leukaemia (CLL) in the NHS, and this work has now been published in *PharmacoEconomics*.

Two forms of economic evaluation – cost-effectiveness and cost-utility analysis – were undertaken from an NHS and societal perspective. Five testing and treatment strategies were evaluated across several age groups using Markov modelling: three strategies that reflected varying current genetic testing practice and two configurations of genomic testing (including ibrutinib treatment).

Genomic testing strategies yielded the most life-years and QALYs per patient, but were not cost-effective compared to a threshold of £30,000 per life-year/QALY gained. However, there was some uncertainty surrounding this result: sensitivity analyses indicated that a genomic testing strategy would become the most cost-effective option if a higher "end-of-life" threshold of £50,000 was applied, a societal costing perspective was considered (particularly for younger patients), or the cost of ibrutinib treatment falls. Given these findings, the study concludes that stratifying CLL patients to ibrutinib treatment using genomic testing is unlikely to represent a cost-effective use of limited NHS resources.

The analyses reported in this paper form part of a wider body of work considering issues related to the economic analysis of genomic technologies (see link below). Future publications will consider whether alternative approaches (including cost-benefit analysis) would change the conclusions of this economic evaluation.

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**HERC at iHEA**

Between 9th-11th July, HERC researchers delivered a number of presentations at the 12th International Health Economics Association World Congress in Boston, USA.

**Alastair Gray:** Estimating the quality of life impact of disease diagnosis using retrospective population self-reports: the example of Coeliac Disease in the UK.

**Elizabeth Stokes:** Can routine administrative datasets reliably provide resource use data for the purposes of economic evaluation?

**Filipa Landeiro:** Can delayed discharges be reduced through interventions to alleviate social isolation?

**Jacqueline Murphy:** Developing a mapping algorithm to predict EQ-SD utilities using Oxford Shoulder Score responses.


**Joel Smith:** Insulsive benefits and treatment effect heterogeneity in randomized experiments.

**José Leal:** The impact of hospital costing methods on cost-effectiveness analysis.

**Iryna Schläckow:** Methods for temporal extrapolation from clinical trial data to inform economic evaluations: a taxonomy.

**Mara Violato:** Family income and exposure to norovirus in childhood: findings from the UK Millennium Cohort Study.

**Richéal Burns:** Economic burden of cardiovascular diseases across the European Union: trends over the last decade.

**Sarah Wordsworth:** Can leveraging ‘Big Data’ make economic assessment more precise? Costing rare disease care using linked data from the UK 100,000 Genomes Project.

**Seamus Kent:** Use and costs of primary care in relation to body mass index in middle-aged and older women in England: A prospective cohort study.

**Sophie Diarra:** A longitudinal study of child respiratory disease in the United Kingdom: the effect of income and other risk factors.

**Thomas Rouyard:** Trade-off between behavior change and health outcomes: An analysis under prospect theory.

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**Spotlight on MI JUN KENG**

I joined HERC in October last year, as part of the team conducting economic evaluation work as part of the REVEAL trial. REVEAL is a large international randomised trial coordinated by the Clinical Trial Service Unit in Oxford that is assessing the effect of anacetrapib in combination with statin treatment to prevent vascular diseases in patients with pre-existing cardiovascular conditions. Our aim is to evaluate the economic impact of anacetrapib from the perspective of the UK and USA healthcare systems.

My academic background is in Mathematics, and I received my Bachelor’s Degree in Mathematical Sciences from the Nanyang Technological University in Singapore. I then pursued a Master’s Degree in Operational Research at the London School of Economics, where I had the opportunity to work with social policy researchers involved in the Collaboration for Leadership in Applied Health Research and Care (CLAHRC) North Thames project on redesigning the care pathway for diabetic patients. As part of this project, I developed a model to evaluate the effect of diabetes prevention schemes, including the diabetes prevention programme rolled out in the UK last year. This work provided me with a first glimpse into the area of healthcare, and piqued my interest in applications of mathematical models within the field.

Though I have only been with HERC for a short time, I have benefited immensely from the training opportunities provided and from learning on the job. In the future, I hope to further explore the subject and ultimately develop my own research interests in this field.
Presentations by members of HERC

4th International Clinical Trials Methodology Conference, University of Oxford, May 2017
Apostolos Tsaiachristas & RichardBurns
Understanding and interpreting health economic evaluation alongside clinical trials.

RichardBurns
A systematic review of analytical methods applied for discarded organs in kidney and liver transplantation research on the findings of the systematic literature review alongside one of the QoP trials on organ preservation.

IrynaSchlackow
Methods for extrapolation from clinical trial data to inform economic evaluations: a systematic review.

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

Department of Economics at University of Bergen, Norway, May 2017
PeterEibich
Retirement and manmortality: the role of organized screening programs.

International Conference in Integrated Care
Dublin, May 2017
Apostolos Tsaiachristas

Economic evaluation of integrated care: considerations and developments.

Evaluating the cost-effectiveness of population health interventions alongside literature reviews: the case of the comprehensive geriatric assessment.

Fellows Symposium, Oxford, May 2017
Apostolos Tsaiachristas

Health Economics Research Unit (HERU), University of Aberdeen, June 2017
SarahWordsworth
Economics and whole genome sequencing.

School of Social and Community Medicine, University of Bristol, June 2017
HelenDakin
Uncertainty within trial-based economic evaluations extrapolated using patient-level simulation models.

2nd Annual UK & Ireland PROMs Research Conference, Oxford, June 2017
HelenDakin
The Anthropod Candidacy Help Engine - Using PROMs data to identify thresholds for referral in hip and knee replacement surgery.

LucyAbel
Evaluation of adherence to the MAPS Reporting Statement in recently published studies mapping to EQ-SD from clinical or patient-reported outcome measures.

InesRombach
To impute or not to impute? A comparison of statistical approaches for analysing missing longitudinal patient reported outcome data in randomised controlled trials.

MRC Doctoral Training Programme Symposium
Oxford, June 2017
SaraDiarra
A longitudinal study of child respiratory disease in the United Kingdom: the effect of income and other risk factors.

Health Economists’ Study Group Meeting (HESG), University of Aberdeen, June 2017
ElizabethStokes
The use of health economics and precision medicine.

School of Health and Related Research (ScHARR), University of Sheffield, July 2017
HelenDakin
Uncertainty within trial-based economic evaluations extrapolated using patient-level simulation models.

International Health Conference 2017, St Hugh’s College, Oxford, July 2017
BortislavaMihaylova
Are statin-based therapies cost-effective in Chronic Kidney Disease?

Publications


