Abstract Booklet

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ID: 3411

Author: Melanie Antunes (University of Aberdeen)

Co-Authors: Verity Watson, Marjon van der Pol (University of Aberdeen); Richard Norman (Curtin University); Suzanne Robinson (Curtin University; Deakin University)

Title: Investigating people preferences for Social Prescribing using a Discrete Choice Experiment

Abstract: Background: Social Prescribing (SP) aims to address the social determinants of poor health by allowing health professionals to prescribe non-medical services to patients. SP is a complex pathway with benefits beyond health and its implementation can be adapted for each unique context. However, evidence from previous studies shows that uptake of prescribed non-medical services can be low. Tailoring SP to align with the preferences of different populations may be necessary to maximise the service's value. For example, preferences may vary depending on the condition SP is prescribed for. This paper uses a Discrete Choice Experiment (DCE), to explore preferences for SP to support people with one of two health conditions: chronic pain and anxiety and/or depression.

Methods: We designed a DCE to explore which SP characteristics are valued and whether preferences differ depending on the health condition being treated. Qualitative work with both patient groups informed the DCE survey design. We recruited a sample of the general population in Scotland to an online survey in July 2022. People with lived experience of the conditions were asked to complete the survey from that perspective. Otherwise, people were randomised to consider SP for one of the two conditions.

Results: A sample of 654 respondents completed the DCE and was representative of the general population in age and gender. Preliminary results show that people value SP and additional support alongside SP. We find both differences and similarities in WTP across subgroups. WTP for SP is higher when people answer from an anxiety/depression perspective than a chronic pain perspective. The most valued SP activities differ across subgroups. Respondents who replied from an anxiety or depression perspective are willing to pay more for confidentiality than respondents who replied from a chronic pain perspective. Respondents in both subgroups are willing to pay more to be followed-up by health professionals after the referral rather than not being followed-up.

Conclusion: We find that WTP for SP characteristics varies across different conditions. What works for one health condition may not work for another. Therefore, SP needs to be tailored to the needs of the patients it is offered to.

ID: 3311

Author: Angela Bate (Northumbria University)

Co-Authors: Sonia Dalkin (Northumbria University); Rob Anderson (University of Exeter); Rachel Baker (Glasgow Caledonian University); Cam Donaldson (Glasgow Caledonian University); Meghan Kumar (London School of Hygiene and Tropical Medicine); Gill Westhorp (Charles Darwin University); Judy Wright (University of Leeds); Geoff Wong (Oxford University); Vivienne Hibberd (PPI); Felicity Shenton (NIHR ARC NENC)

Title: Developing Realist Economic Evaluation Methods (REEM) to Evaluate the Impact, Costs, and Consequences of Complex Interventions

Abstract: In this paper we set out our research which aims to bring together realist and economic evaluation to develop realist economic evaluation methods (REEM). Guided by an international panel of experts and PPI, this three year NIHR HS&DR funded study involving the development and testing of methods and guidance will advance understanding of how these approaches can be integrated and develop forms of evaluation that both enables economic evaluation to become more context-sensitive and explanatory, and realist evaluations to better capture the role of resources and the opportunity costs. We are keen to seek the wider input of HESG members from the outset to ensure that we capture the multiplicity of views, perspectives, and experiences of the community to shape this research.

In recent years, there has been increasing recognition that complex interventions require new methods of evaluation that embrace and account for complexity. This has most recently been articulated in the paper presented at the 100th HESG in Sheffield by Sutton and colleagues, the updated MRC framework for developing and evaluating complex interventions and the recent updates to the ISPOR Consolidated Health Economic Evaluations Reporting Standards (CHEERS) II statement. However, economic evaluation methods often do not fully account for and the importance of context on outcomes, or how interventions work differently for different people. Further, the results of economic evaluations in health and social care are often poorly generalisable (transferable). Yet the actual methods of economic evaluation have made few advances to address these concerns. On the other hand, realist evaluation was designed to evaluate complex social interventions, evaluating how and why interventions are effective for different groups and in different settings. But realist evaluations do not tend to explicitly capture the economic costs or consequences of interventions. This represents a methodological gap in the evaluation of complex interventions and a key limitation to providing applicable evidence for policy and service delivery. We argue that, despite their different (implicit or explicit) ontological and epistemological bases, there is considerable potential for realist and economic evaluations not only to learn from each other but to be combined, bridging this methodological gap.

ID: 3379

Author: Habtamu Beshir (University of Bath)

Co-Authors: Eleonora Fichera (University of Bath)

Title: Impacts of Low Emission Zones on Health: Evidence from Hospital Episode Statistics

Abstract: Objectives: The main objective of our study is to investigate the effects of London's Low Emission Zone (LEZ) and ULEZ Ultra-Low Emission Zone (ULEZ) on hospital emergency admissions for respiratory diseases. LEZ was launched in 2008 over most of Greater London. ULEZ, implemented in central London since early 2019, is the toughest standard of any city in the world imposing strict emission standards such as: Euro 4 for petrol cars and vans; Euro 6 for diesel cars; Euro 6 for diesel vans; and Euro 6 for lorries, buses, and coaches.

Data and Methods: We have used Freedom of Information requests on postcode level data from Transport for London (TfL) to identify the areas under LEZ ad ULEZ. Using this information and with the help of the NHS digital team, we have constructed individual level exposure/treatment to LEZ and ULEZ based on the patient's postcode in the Hospital Episode Statistics (HES) dataset. Our outcome measures are hospital admissions from three major disease groups, as identified by systematic reviews: respiratory diseases, circulatory diseases, and nervous diseases. Moreover, we have used LSOA socioeconomic data from the ONS and Weather data from the Met Office - MIDAS Land Surface Stations to account for area level differences.

We then use difference-in-differences and synthetic control methods exploiting the time of introduction of LEZ and ULEZ and comparing exposed areas in Greater London and Central London to comparable unexposed areas in England.

Results: We find that exposure to LEZ and ULEZ significantly reduce hospital admissions for the three disease groups. Specifically, LEZ and ULEZ policies reduced hospital admissions due to asthma and acute respiratory infections. This impact is stronger for younger age groups and those living in relatively more deprived areas.

ID: 3402

Author: Sian Besley (Office of Health Economics)

Co-Authors: Peter Sivey; Rita Santos (University of York)

Title: The Effect of Distance on Accident and Emergency Department Demand

Abstract: Over time, demand for England's accident and emergency departments (AEDs) has increased at a rate greater than population growth. Simultaneously, financial constraints and consolidation of resources have resulted in the downgrading and closure of many AED departments. Considering these developments, it is crucial to have a greater understanding of the determinants of AED demand to understand how to cater to future demand.

When individuals choose to attend an AED, they must incur the time and financial costs of travel, which are both likely to increase with distance. In this paper, we use area-level regression analysis to estimate the relationship between travel distance and emergency department demand.

The primary source of data used was the hospital episode statistics accident and emergency (HES A&E) dataset for 2018/19 which contains unit-record information on every A&E attendance in England. We calculate small area-level (LSOA-level) variables including the number of A&E attendances, average distance travelled to an A&E department and attributed ONS information on population age, gender and social deprivation and GP practice information on workforce and disease prevalence.

The area-level quasi-maximum likelihood regression model results suggest that distance reduces emergency department demand. Our main specification yields a distance elasticity of emergency care demand of -0.04 which implies a one standard deviation increase in distance travelled (8.6km or approximately 80% of the mean of 10.7km) is associated with 3.4% fewer attendances (22 fewer attendances at the mean attendances per LSOA). In addition, subgroup analysis shows that at 24-hour consultant-led services with full resuscitation facilities, the elasticity is substantially smaller for patients who are considered high urgency, highlighting that the severity of the individual's symptoms or injury may be important for determining the role distance travelled plays in the decision to attend an emergency department. This finding implies that patients trade off potential health gain with the cost of accessing emergency care in their healthcare choices; patients delay travelling until their condition is more severe. Policymakers should consider this trade-off when determining the healthcare services available and the potential impact on population health.

ID: 3324

Author: Corneliu Bolbocean (University of Oxford)

Co-Authors: Arri Coomarasamy (University of Birmingham); Julia Hippisley-Cox, Catia Nicodemo (University of Oxford); Siobhan Quenby (University of Warwick); Lucy Smith, (University of Leicester); Stavros Petrou (University of Oxford)

Title: The Impact of Miscarriage on Self-Harm and Mental Health Outcomes among First-time Pregnant Women: Evidence from a UK registry linkage study

Abstract: Study Objective: To estimate the impact of the first known miscarriage on developing short, medium and long-term self-harm, and mental health outcomes using linked, routinely collected health records from over 600 general practices in the UK.

Data: On a random sample of 1.2 million women, we identified all first pregnancies using primary care, hospital records and maternity care records in the UK between 1 January 2004 and 31 December 2017. Each first pregnancy was categorized into two mutually-exclusive groups: miscarriage vs continued pregnancy using robust medical definitions (ICD-10 and Read codes). Women with histories of self-harm, mental health or psychotropic medication have been excluded from our sample.

Methods and Identification: We exploited the biological fact that the first pregnancy which ends up in miscarriage is largely an exogenous shock to fertility and used selection on observables methods (logistic regression, the augmented-inverse probability weighting estimator, and coarsened matching) to estimate treatment effects. As a sensitivity analysis we utilised entropy matching and provided bounds for the effect using a partial identification approach proposed by Oster. Disparities by the socioeconomic gradient of health (measured using the Townsend Index of Socioeconomic Deprivation) were quantified using the Wagstaff and Erreygers concentration indexes.

Results: Miscarriage was associated with a significantly increased risk of self-harm (adjusted odds ratio 2.3, 95% CI: 1.48, 3.29), depression or anxiety (adjusted odds ratio 1.5, 95% CI: 1.22, 2.08), post-traumatic stress disorder (adjusted odds ratio 1.15, 95% CI: 1.06, 1.24) at 6 months follow up. These effects typically did not persist longer than a year follow up after the first pregnancy. Adverse effects after 1 year follow-up from the first miscarriage are likely masked by the higher incidence of postpartum adverse outcomes in the comparator group or may be related to subsequent fertility outcomes of miscarried women. The effect of miscarriage on outcomes considered was not distributed equally across the socioeconomic gradient of health.

Conclusions: Miscarriage is predominantly associated with self-harm, depression/anxiety, post-traumatic stress disorder, and antidepressants up to one year. Exploring the impact of miscarriage on socioeconomic outcomes is potentially a fruitful direction for future research.

ID: 3285

Author: John Buckell (University of Oxford)

Co-Authors: Alice Wreford (University of East Anglia); Thomas Hancock (University of Leeds)

Title: Do conventional approaches to modelling health preference distributions suffice? Model averaging of random preference heterogeneity representations in discrete choice models

Abstract: Any sample of individuals has its own, unique distribution of preferences for the attributes of the alternatives that they choose. Discrete choice models try to capture these distributions. A raft of parametric model specifications enable the analyst to estimate a diverse set of distributions. These range from discrete distributions (i.e. latent class models) to continuous distributions (i.e. mixing models), and combinations thereof. Continuous distributions can take simple forms such as a normal distribution, or more flexible forms such as the polynomial function(s) of Mabit and Fosgreau (2013). More complex specifications allow for desirable properties of the distribution such as asymmetry and multimodality; and the researcher can test if the additional flexibility is warranted, given the data. However, the final choice of a specification that satisfactorily approximates the underlying distribution of preferences in the sample is subjective, and is thus prone to analyst bias.

In this paper, we propose a new, simple approach using model averaging to capture yet more flexible distributions of preferences. This approach takes any number of single specifications, and gives each an empirically-derived weight based on its contribution to the overall fit of the model. Model averaging can incorporate any number of underlying specifications, allowing more flexibility than with single specifications. Further, its simplicity means that highly flexible distributions are still possible when more complex specifications cannot be estimated.

We investigate the extent to which model averaging is useful for explaining choices in health settings. The most common approaches in health to capturing random heterogeneity are compared to each other, to a range of highly flexible distributions, and to model averaging approaches. We make these comparisons in cases where deterministic heterogeneity is specified and not. Comparisons provide insight into whether conventional approaches are able to adequately capture random preference heterogeneity, and whether parameter estimates are biased under simpler specifications. Using simulated data, we also test whether model averaging across models with simpler distributions can recover a more complex true underlying distribution of preferences. Finally, we test the extent to which model averaging improves model performance, and so if ought to become standard practice in health settings.

ID: 3368

Author: Philip Clarke (University of Oxford)

Co-Authors: Tony Blakely (University of Melbourne; University of Otago); Laxman Bablani (University of Melbourne); Finn Sigglekow (University of Otago)

Title: The relationship between disease and income inequality: National level analysis using linked data from New Zealand

Abstract: Background: There has been considerable interest in the degree to which income inequalities may impact both population and individual health. While it has also been recognised that disease may affect income inequality, there have been few attempts to measure the overall relationship at a country level.

Aims: To quantify the degree of income loss that is associated with 12 disease categories (cancer, cardiovascular, endocrine, gastrointestinal, genitourinary, infectious, injury, mental health, musculoskeletal, respiratory, skin, reproductive and sensory) and to estimate the impact on income inequality at a country level.

Methods: Around 22.5 million person-years of data from New Zealand (collected between 2007 and 2016) involving income from tax records linked to information on hospitalisations, cancer and diabetes registries and mental health data. Disease-specific income loss was estimated using panel fix-effects regression estimators. Simulations were used to estimate within-person marginal effects of income on being diagnosed with a disease, dying of that disease, and being otherwise prevalent with that disease (compared to no disease). Estimates of income loss by disease were calculated, and the degree of regressivity was quantified using the Reynolds-Smolensky Index. We also examined the degree sickness benefits could reduce income inequalities.

Results: The loss in income associated with having one or more diseases was regressive, ranging from 7.5% in the most deprived quintile to 2.3% in the least deprived quintile. Simulations indicate that the absence of disease was associated with a decline in the Gini of 4.43% from 0.549 to 0.525. Including sickness benefits and accident compensation, the Gini decreased by 3.37% (from 0.506 to 0.489), demonstrating a moderate impact of compensation to mitigate income inequality. By disease, the most significant contributors to the gap between actual and counterfactual-without-disease income inequality were mental health disorders (35%), cardiovascular disease and musculoskeletal disorders (both 14%).

Discussion: Our results provide a measure of the association between disease and income inequality at a national level and the degree to which sickness benefits reduce the impact of major health conditions on income inequality. We will discuss the feasibility of using these methods in other countries including the UK.

ID: 3403

Author: Madeleine Cochrane (University of Bristol)

Co-Authors: Cochrane, M. (University of Bristol); Graves, L.E.F. (Liverpool John Moores University); Collins, B. (University of Liverpool); Garfield, K.M. (University of Bristol); Ridd, M. J. (University of Bristol); Drake, M. J. (Imperial College London); Edwards, R. T. (Bangor University); Timpson, H. (Liverpool John Moores University); Worthington, J. M. (University of Bristol); Frost, J. (University of Bristol); Noble, S. M (University of Bristol)

Title: The role of anthropology in improving our understanding of the quality of resource-use data collected alongside trials for economic evaluation

Abstract: Resource-use data, collected alongside trials to estimate costs for economic evaluations, are complex. This complexity arises because of the number of resource-use components and multiple data sources involved. Moreover, collecting, recording, producing, cleaning and interpreting resource-use data are complex processes typically involving numerous people and organisations. Analysts conducting economic evaluations are required to understand this complexity so they can judge the quality of the resource-use data they use. Formal and structured approaches to understanding complexity such as one-off interviews and focus groups are unlikely to suffice. This is because understanding the quality of resource-use data is an iterative process where in practice queries about the quality of multiple data sources typically arise multiple times throughout the study. This is especially true when analysts use routine data because data are not typically collected for research purposes and datasets are rapidly evolving in accordance with the advances in data science. In practice, analysts may use informal and less structured approaches to understand the quality of their data. These approaches typically include informal conversations and notes made throughout the duration of the study, as well as making assumptions by implicitly or explicitly reflecting on their own previous knowledge, experience and training. In the field of anthropology, data derived from such informal and reflective methods are perceived to be a valid source of knowledge. This paper presents three case studies to support analysts in recognising how concepts from the field of anthropology may help in understanding, documenting and sharing key learnings about the quality of their resource-use data. More specifically, the paper presents three case studies from primary care and public health trials which have used self-report and routine data to measure resource-use for the following health conditions: lower urinary tract symptoms, sedentary behaviour and physical inactivity. For all three, the iterative, informal and reflective methods used to investigate the quality of the resource-use data are reported. Our findings illustrate how concepts from anthropology can provided analysts with a theoretical, pragmatic, and transparent approach to capturing and reporting on the complexity and quality of resource-use data used in economic evaluation.

ID: 3312

Author: Charlotte Davies (RAND Europe; University of East Anglia)

Co-Authors: Catherine Saunders (University of Cambridge); Fifi Olumogba (RAND Europe); Mannbinder Sidhu (University of Birmingham); Jon Sussex (RAND Europe)

Title: The extent of acute hospitals managing general practice (vertical integration) and its impact on secondary care utilisation in the NHS

Abstract: Debate surrounding the organisation and sustainability of primary care in the UK highlights the desirability of a more integrated approach to patient care across all settings. One example of this approach is vertical integration, where an NHS acute trust takes over the running of general practices. A previous, qualitative, rapid evaluation by the same research team found the main rationale of vertical integration was to prevent GP practices from closing. The current follow-up study by the NIHR BRACE team seeks to identify the extent of such vertical integration in England and its impact on secondary care utilisation.

We established the extent of vertical integration through a desk-based analysis of secondary care statutory financial reporting and primary care GP workforce data, describing the key characteristics of practices which have undergone vertical integration. The impact of vertical integration on secondary care utilisation is assessed using a difference in differences analysis of HES data in terms of key outcome measures (outpatient and A&E attendances, all inpatient and emergency inpatient admissions, inpatient admissions for ambulatory care sensitive conditions, bed days, readmission) for patients of the identified practices and their controls, before and after the identified practices were vertically integrated.

The process of identification of vertical integration is not straightforward. There were several methodological issues including horizontal mergers of GP practices and trust mergers. We have identified, as at March 2021, 26 NHS trusts running 90 general practices (out of a total of 6,765 practices in England): 55 by acute trusts and 35 by community trusts. The mean number of practices per trust was 4.7 (range 1 to 16), with the first case of vertical integration taking place in 2015 (apart from a small number of practices for homeless and vulnerable populations). Vertically integrated GP practices were smaller in terms of practice list size and FTEs of GPs employed per patient population. These practices also tend to be poorer performing in terms of QOF scores, located in more deprived areas and are more likely to hold an APMS contract. Analysis of secondary care utilisation is ongoing and findings will be provided in the full paper.

ID: 3320

Author: Duyen Duyen Nguyen (Queen's University Belfast)

Co-Authors: Ciaran O'Neill (Queen's University Belfast)

Title: How did the inequality of smoking change over time in Northern Ireland: Findings from the Continuous Household Survey 1985-2015

Abstract: Background: Under a comprehensive package of tobacco control measures, smoking rates in UK dropped to less than 15% but inequalities in smoking remain. How smoking inequality and the role of contributors to smoking inequality have changed over time has the potential to offer useful insights into the development of future policy responses.

Method: This study used the Continuous Household Survey in Northern Ireland from 1985-2015 covering 16 rounds with available data on smoking. Multivariate analysis and marginal effects were first employed to determine the significant correlates of smoking in addition to socioeconomic status. Concentration indices & concentration curves were used to estimate the socioeconomic inequality in smoking for each year before data were pooled and smoking inequality for three periods: 1985-1995, 1997-200 and 2007-2015 and compared to test for significant changes. The contribution to smoking inequality in each period and in general was examined using the Blinder-Oaxaca decomposition approach. Sensitivity analysis employed the multiple imputation by chained equations to impute missing data.

Results: From 1985 to 2015, there was a significant decrease in smoking rate in Northern Ireland from 33.7% to 19.9%. This coincided with a significant increase in the income related inequality in smoking from -0.08 (SD = 0.006) during 1985-1995 to -0.17 (SD = 0.007) in 1997-2005 and reached -0.17 (SD = 0.007) during 2007-2015 measured as the Erreygers' concentration index. This represents a significant worsening in the pro-poor concentration of smoking behaviour over the 30-year timeframe studied. Several factors contributed to the inequality in smoking in Northern Ireland including employment and drinking status, education and age structure.

Conclusion: The joint implementation of taxation, health education and public health initiatives such as smoking ban in public places have likely contributed to the observed decline in smoking in Northern Ireland over the past 30 years. This has coincided with a sharpening of income related inequalities in smoking. Current approaches to tobacco control may be ill-suited to addressing inequalities in smoking related behaviours and may indeed prove counter-productive. A re-imaging of how to change behaviours specifically among those with low income may be required if inequalities are to be addressed.

ID: 3372

Author: Ourega-Zoe Ejebu (University of Southampton)

Co-Authors: Chiara Dall'Ora; Peter Griffiths (University of Southampton)

Title: Are long nursing shifts associated with worst patient outcomes: a longitudinal analysis using data from Mental and Community Health Trusts?

Abstract: Background & Objectives: A growing literature has documented that patient care is compromised when nurses work longer shifts. Long nursing shifts (i.e. more than 12h) are particularly prevalent in Acute Trusts and are becoming more and more common in Mental Health and Community Trusts to deliver 24h patient care. Noticeably, research focussing on the effects of long shifts and patient outcomes in Mental Health and Community Trusts is limited. This study aims to fill this gap, using longitudinal data from one large Mental Health and Community Trust in Wessex. The data administers a rich set of retrospective variables (2018-2021), including the daily number, type and location of patient incidents, and the date, type and location of shifts worked by nursing staff. This longitudinal survey enables us to provide a unique perspective of the potential effects of long nursing shifts on patient outcomes.

Methods: There are 40,686 observations where patient and shift-related variables have been aggregated at the "day-cost centre level" (cost centre~ ward in the Trust). To estimate the long-term relationship between long shifts and patient outcomes (i.e. number of patient incidents), we use a variety of econometric techniques including mixed-effect Negative binomial models. Such models enable us to shed new light on the effect of long shifts on the number of patient incidents. In addition, mixed-effect Negative binomial models seem like a natural choice considering the over-dispersion between the mean and the variance of the number of patient incidents.

Preliminary results: Preliminary results indicate that the relationship between long shifts and the number of patient incidents follow an "N-curve", such that the number of patient incident rises with higher rates of long shifts at the day-cost centre level. We further aim to examine the effect of long shifts on specific types of incidents (e.g. slip/fall, self-harm, etc).

ID: 3375

Author: Md Zahid Hasan (University of Leeds)

Co-Authors: Edward Webb (University of Leeds); Zahidul Quayyum (BRAC University); Tim Ensor (University of Leeds)

Title: Technical Efficiency of Bangladeshi Subdistrict Level Hospitals Using Output-Oriented Data Envelopment Analysis

Abstract: Background: In Bangladesh, sub-district level hospitals (SDHs) provide primary healthcare to the population in both municipal and rural areas. The efficient use of resources in primary-level healthcare facilities is essential for delivering quality services. Therefore, our aim was to estimate the technical efficiency (TE) of the SDHs in Bangladesh.

Methods: We used an output-oriented data envelopment analysis (DEA) method to estimate the variable returns to scale (VRS) and constant returns to scale (CRS) TE of a total of 423 SDHs using data from Local Health Bulletin-2017. To measure technical efficiency, we used workforce and inpatient beds as input variables and number of inpatients and outpatients served by the hospitals in a month as output variables. We applied a Tobit regression model to find how the other internal and external characteristics of these hospitals influenced estimated TE score.

Results: The average VRS and CRS TE of the SDHs were estimated to be 58% and 53% respectively. Of the 423 SDHs, 15 were comparatively fully efficient using CRS and 25 were fully efficient using VRS and 73 were Scale efficient. The bed occupancy ratio, adult literacy, and administrative region of the SDHs had a significant positive influence, while lengths of stay had a significant negative influence on the efficiency score of the SDHs. The mean TE using VRS and CRS demonstrated that the SDHs, on an average, could improve their output by 44% and 42% using the existing level of input mix.

Conclusions: The average TE of the SDHs was half of the best score suggesting there is scope for overall improvement among the inefficient facilities by learning from the efficient facilities. The Ministry of Health and Family Welfare (MoHFW) of Bangladesh allocates resources to SDHs based on the number of beds rather than assessing needs. The MoHFW may improve their monitoring system to investigate why some facilities are performing well using the similar resources while others do not and adjust the payment system to take account of quantity and quality of care. As DEA does not account random variation, in future we will also examine TE using stochastic frontier analysis method.

ID: 3423

Author: Zaid Hattab (University of Galway)

Co-Authors: Sadique, Z. (London School of Hygiene & Tropical Medicine); Ramnarayan P. (Imperial College London); O'Neill, S. (London School of Hygiene & Tropical Medicine)

Title: Exploring heterogeneity in cost-effectiveness using machine learning methods: A case study using the First-ABC Trial

Abstract: FIRST-line support for assistance in breathing in children (FIRST-ABC) is a non-inferiority randomized controlled trial (RCT) (ISRCTN60048867) which has been conducted on six hundred children, aged 0-15 years, clinically assessed to require noninvasive respiratory support. The trial compared high flow nasal cannula therapy (HFNC) with continuous positive airway pressure (CPAP) as the first-line mode of noninvasive respiratory support for acute illness in children. On the clinical side, HFNC was found to be noninferior to (CPAP) in the aggregate analysis, with a median time to liberation from all respiratory support (excluding supplemental oxygen) of 52.9 hours (95% CI, 46.0 to 60.9) versus 47.9 hours (95% CI, 40.5 to 55.7).

This study explores heterogeneity in the cost-effectiveness (rather than the efficacy) of HFNC compared with CPAP considering total costs, QALY, and net monetary benefit (NMB) at six months as the main outcomes. Heterogeneity is explored at the individual and subgroup levels, using the causal forest approach which allows for complex interactions between baseline covariates when estimating effects while avoiding overfitting. We consider CF alongside parametric approaches for estimating heterogeneity in Treatment Effects. We predict the individualized effects on cost, QALY, and NMB using a willingness-to-pay threshold of £20,000, and then estimate effects for pre-specified subgroups defined by age (=12 months), co-morbidities (none vs neurological vs other), length of prior Invasive Mechanical Ventilation (IMV) (=5 days), reason for IMV (cardiac vs non-cardiac), reason for respiratory support post-extubation (planned vs indeterminate vs rescue) and SpO2:FiO2 ratio at randomization.

The preliminary findings show that HFNC is cost-effective compared to CPAP for most of the individuals. However, the evidence of heterogeneity is modest.

ID: 3294

Author: Edward Henry (University of Galway)

Co-Authors: Eve Wittenberg (Harvard University); Hareth Al-Janabi (University of Birmingham); John Cullinan (University of Galway).

Submitted for and on behalf of the membership of the Spillovers in Health Economic Evaluation and Research (SHEER) task force: Werner Brouwer (Erasmus University); Joanna Coast (University of Bristol); Lidia Engel (Monash University); Susan Griffin (University of York); Claire Hulme (University of Exeter); Pritaporn Kingkaew (HITAP); Andrew Lloyd (Acaster Lloyd); Luz María Peña Longobardo (University of Castilla la Mancha); Nalin Payakachat (University of Arkansas Medical Sciences); Becky Pennington (University of Sheffield); Lisa Prosser (University of Michigan); Koonal Shah (NICE); Wendy Ungar (University of Toronto); Thomas Wilkinson (World Bank Group)

Title: Spillovers in Health Economic Evaluation and Research (SHEER) Task Force: Recommendations for Best Practice and a Future Research Agenda

Abstract: Background: Whilst there is a growing recognition that the impacts of illness upon carers and families should be accounted for in the economic evaluation of healthcare interventions, omission of these ‘health spillovers' from such analyses remains common practice. Moreover, a high degree of methodological inconsistency among those economic evaluations incorporating spillovers has been observed.

Aim: To aid future spillover inclusion efforts and to promote evidence-based best practice, the Spillovers in Health Economic Evaluation and Research (SHEER) task force aims to provide guidance to the health economics and outcomes research (HEOR) community on the incorporation of carer and/or family health spillovers in cost-effectiveness and cost-utility analysis. SHEER will also identify and explicitly describe issues requiring additional evidence in order to inform the basis for the spillover research agenda and future practice.

Methods: A modified nominal group technique is being used to reach consensus on a set of recommendations, representative of the views of subject matter experts. Group members have been drawn from a range of work environments, both academic and non-academic; the task force has sought to gain insight from research institutes/organisations, regulatory agencies/HTA bodies, and the life sciences industry, across numerous jurisdictions. Group interactions will culminate in two forum-style meetings, in October and November 2022, in which the recommendations will be proposed and voted upon. Discussions will focus on the state of current practice, what constitutes evidence-based best practice, and the common barriers and challenges preserving the gap between the two.

Results: The final set of recommendations, arrived at via two rounds of voting, will be included in a preliminary report of the task force, to be submitted for discussion at the Health Economists' Study Group (HESG) Winter 2023 Meeting.

Discussion: Consideration of the wider impacts of illness in health economic evaluation has been called for by researchers and policymakers alike. To this end, it is hoped that the consensus recommendations of SHEER will provide those seeking to incorporate spillovers into cost-effectiveness and cost-utility analysis the means to do so in a consistent manner where possible.

ID: 3337

Author: Daniel Howdon (University of Leeds)

Co-Authors: Andy Charlwood (University of Leeds)

Title: The impact of substituting care assistants for nurses in care home staffing

Abstract: This paper uses data from a large British care home operator to investigate the impact on quality outcomes - predominantly hospitalisation numbers - of partially replacing the provision of care by nurses with provision by senior care assistants. This meant an increase the proportion of care provided in homes by less qualified staff. The implementation of this staffing policy happened across only a proportion of the operator's care homes and was non-simultaneous, taking place sequentially across a time period spanning approximately three and a half years. Timing of implementation was non-targeted with care homes selected early or late during this period for administrative reasons rather than because of any characteristics of the care home.

Staggered difference-in-difference analysis, under the assumption that the implementation of these staffing reforms was implemented in a manner that is as good as random, is used to investigate the impact of this change on various outcome measures, including in-home falls and hospital admissions from these homes. The conventional difference-in-difference parallel trends assumption is both tested for on various outcome measures and discussed in terms of its relevance both in this particular case- which can be seen as analogous to a randomised trial with staggered implementation- and for the staggered difference-in-difference method more generally.

Our primary results suggest an average treatment effect generally implying a worsening of these quality outcomes that appears to be relatively consistent across care homes implementing the policy. This suggests that regulators should be mindful of potential worsening of care when care home operators seek to replace more qualified staff with less qualified staff.

This result is however sensitive to the estimation method employed and this work highlights difficulties in employing DiD-type methods, that even reduced form methods such as these require substantial assumptions regarding the underlying data generating process, and that researcher degrees of freedom are a concern in work such as this. We present a battery of alternative results and discuss their relative plausibility.

ID: 3421

Author: Li Jiaqi (University of Warwick)

Co-Authors: Gabriella Conti (University College London; Institute for Fiscal Studies); Anica Kramer (University of Bamberg; Institute for Employment Research; Leibniz Institute for Economic Research); Sören Kliem (University for Applied Science Jena); Andrea Salvati (University College London); Malte Sandner (Institute for Employment Research)

Title: The Effect of Early Home Visiting on Maternal and Child Mental Health at Primary School Age

Abstract: Motivated by the growing evidence on the importance of early investments on human capital development, home visiting programs aimed at improving parenting skills and home environment are becoming increasingly popular worldwide. Yet, most of their evaluations focus on cognitive and socio-emotional skills in the first years of life, while evidence on mothers' and children's mental health is scarcer.

From a theoretical standpoint, it is not obvious whether home visiting programs have lasting effects on mental health. On the one hand, these interventions mostly focus on improving parenting skills rather than providing therapeutic counselling. On the other hand, home visits may beget a strong attachment between the nurse and the mother, which may have positive effects on stress and isolation, common causes of mental health issues. These, in turn, can generate positive spillovers on a child's own mental health and overall development.

In this paper, we study the impacts of the German home visiting program Pro Kind, by evaluating a randomized controlled trial (RCT, n=755) and a 5-year follow-up. Born as adaptation of the well-known Nurse Family Partnership (NFP), the Pro Kind was specifically designed to improve maternal and child health, as well as parental skills of first-time disadvantaged mothers. Treated women (n=397) received assistance by family midwives and social workers from pregnancy until the child's second birthday.

Using fully standardized diagnostic interviews carried out in the 5-year follow-up, we find that the treatment reduced maternal mood disorder (ICD-10, F-30-39) by 7 pp. -- a 32% reduction; and child behavioural and emotional disorders (ICD-10, F-90-98) by 4.5 pp. -- a 21% reduction. These diagnostic results are consistent with survey answers by mothers reporting higher well-being and fewer symptoms of depression, anxiety, and stress, in the treatment group. Hence, Pro Kind improves both maternal and child mental health in a persistent fashion. These results add to a constellation of short-term improvements of maternal well-being, children's development, parenting, and mother-child interactions already reported in previous studies.

In the next step of our analysis, we plan to investigate the mechanisms underlying the mental health improvements, by developing and estimating a dynamic mediation model.

ID: 3373

Author: Edna Keeney (University of Bristol)

Co-Authors: Howard Thom; Emma Turner; Richard Martin; Sabina Sanghera (University of Bristol)

Title: Methods for the Cost-effectiveness Modelling of Screening Interventions in an Uncertain Landscape: Application to Screening for Prostate Cancer

Abstract: Decisions need to be made about who and how to screen for diseases to optimise health in the population. Cost-effectiveness analyses can be associated with many areas of uncertainty, including decision question, parameter and structural uncertainty. Screening interventions are particularly susceptible to such uncertainty due to a constantly changing landscape in screening methods, diagnostic tests, treatments and understanding of natural history. A failure to account for such uncertainty may result in incorrect or uninformed decisions.

The natural history of prostate cancer, in particular, is not well understood and recent developments in the understanding of who and how to screen have provided challenges to the analyst trying to make recommendations on the most cost-effective screening strategy. Using prostate cancer screening as a case study, this paper presents findings from a PhD exploring methods to handle uncertainty when modelling the cost-effectiveness of screening interventions in an uncertain landscape. It shows how a systematic review of previous models can identify areas of parameter and structural uncertainty, how to gain expert consensus with respect to decision question uncertainty, and how to appropriately adapt and calibrate an existing cancer natural history model to a new setting.

The paper will demonstrate how the 22 studies identified in the systematic review informed the structure and data parameters of the model and how a modified-Delphi process identified nine prostate cancer screening strategies that were deemed relevant by experts, including risk-stratified and adaptive approaches. It will also show how the model was calibrated to UK data to find that, of the strategies identified in the Delphi, a once-off screening at age 50 years was optimal.

Many methods are available for dealing with uncertainty in cost-effectiveness modelling. Discussion will focus on the merits and limitations of the methods used, with recommendations given for practice. Recommendations for future research will also be explored, including examining the robustness of the cost-effectiveness results generated using this model to changes in model structure and assumptions. The aim of the paper will be to provide a guide to identifying and dealing with the uncertainty that is inherent in cost-effectiveness analyses of screening strategies.

ID: 3401

Author: Lana Kovacevic (Imperial College London)

Co-Authors: David Lugo Palacios (London School of Hygiene & Tropical Medicine; Imperial College London); Lindsay Forbes (University of Kent); Erik Mayer (Imperial College London); Elias Mossialos (Imperial College London; London School of Economics and Political Science)

Title: Examining the relationship between organisational models and preventable hospitalisations for diabetes complications using a mediation analysis

Abstract: Background: More than 4.9 million people in the UK live with diabetes, with type 2 diabetes (T2D) accounting for 90% of the cases. People with T2D are at a higher risk of developing life-threatening health problems than people without diabetes. However, primary care plays a key role in the management of T2D and prevention of related complications, on which the NHS is estimated to spend around £8 billion every year. In recent years, new collaborative models of general practice (GP) emerged in England, with the aim of reducing pressure on GPs and thereby improving care for patients.

Objective: To assess the extent to which collaborative GP models have reduced preventable hospitalisations for T2D complications through the improvement in the quality of diabetes care.

Methods: We apply the International Classification of Diseases (ICD-10) codes to the Northwest London Whole Systems Integrated Care dataset to identify hospitalisations for T2D complications between April 2018 and March 2019 and construct the outcome variable hospitalisation rates per 10 registered T2D patients. Ten potential mediators measuring diabetes care quality, including HbA1c and blood pressure control, were constructed using the Quality and Outcomes Framework definitions. To account for the practice's self-selection into collaborative models, we used an instrumental variable approach combined with the product of the coefficient method for mediation analysis to estimate the influence of collaboration on preventable hospitalisations through its association with the mediators. Collaboration status was instrumented using the number of collaborative groups within the clinical commissioning group, as collaboration may be more likely where these are locally available.

Results: Preliminary results suggest a statistically significant reduction in hospitalisation rates per 10 T2D patients by 0.132 among collaborating practices. However, mediation analysis results point to a lack of a mediating relationship through process indicators of diabetes care quality.

Conclusions: Despite collaborating practices having reduced hospitalisation rates, no mediating relationship was found for observable quality measures. It is crucial to identify the mechanisms underlying this relationship to ensure key lessons are learnt and applied in other settings promoting primary care collaboration. Therefore, we are currently exploring structural indicators of care quality as potential mediators.

ID: 3317

Author: Joseph Kwon (University of Oxford)

Co-Authors: Hazel Squires; Tracey Young (University of Sheffield)

Title: Economic model of community-based falls prevention: seeking methodological solutions in evaluating the efficiency and equity of UK guideline recommendations

Abstract: Background: Falls significantly harm geriatric health and impose substantial costs on care systems and wider society. Decision modelling can inform the commissioning of falls prevention but face methodological challenges, including: (1) capturing non-health outcomes and societal intervention costs; (2) considering heterogeneity and dynamic complexity; (3) considering theories of human behaviour and implementation; and (4) considering issues of equity. This study seeks methodological solutions in developing a credible economic model of community-based falls prevention for older persons (aged 60+) to inform local falls prevention commissioning as recommended by UK guidelines.

Methods: A framework for conceptualising public health economic models was followed. Conceptualisation was conducted in Sheffield as a representative local health economy. Model parameterisation used publicly available data including English Longitudinal Study of Ageing and UK-based falls prevention trials. Key methodological developments in operationalising a discrete individual simulation model included: (1) incorporating societal outcomes including productivity, informal caregiving cost, and private care expenditure; (2) parameterising dynamic falls-frailty feedback loop whereby falls influence long-term outcomes via frailty progression; (3) incorporating three parallel prevention pathways with unique eligibility and implementation conditions; and (4) assessing equity impacts through distributional cost-effectiveness analysis (DCEA) and individual-level lifetime outcomes (e.g., number reaching 'fair innings'). Guideline-recommended strategy (RC) was compared against usual care (UC). Probabilistic and deterministic sensitivity, subgroup, and scenario analyses were conducted.

Results: RC had 93.4% probability of being cost-effective versus UC at cost-effectiveness threshold of £20,000 per QALY gained under 40-year societal cost-utility analysis. It increased productivity and reduced private expenditure and informal caregiving cost, but productivity gain and private expenditure reduction were outstripped by increases in intervention time opportunity costs and co-payments, respectively. RC reduced inequality delineated by socioeconomic status quartile. Gains in individual-level lifetime outcomes were muted. Younger geriatric age groups can cross-subsidise their older peers for whom RC is cost-ineffective. Removing the falls-frailty feedback made RC no longer efficient or equitable versus UC.

Conclusion: Methodological advances addressed several key challenges associated with falls prevention modelling. RC appears cost-effective and equitable versus UC. However, further analyses should confirm whether RC is optimal versus other potential strategies and investigate feasibility issues including capacity implications.

ID: 3369

Author: James Love-Koh (National Institute for Health and Care Excellence)

Co-Authors: Koonal Shah (National Institute for Health and Care Excellence)

Title: Healthcare or societal? NICE's approach to perspective in economic evaluations

Abstract: The perspective of an economic evaluation defines what types of benefit and cost are counted when assessing the value for money of a health intervention. These can range from health benefits and healthcare costs (the 'health sector' perspective') to all relevant costs and benefits, including those relating to economic productivity, criminal justice and education (the 'societal' perspective). This paper describes how the National Institute for Health and Care Excellence (NICE) approaches perspective in its health technology evaluation and guideline development processes and evaluates the arguments for and against the adoption of a societal perspective.

The appropriate perspective to take is dependent upon the objective function of the payer. Under specific conditions, a publicly-funded payer could optimise the decision-making across public sector budgets by adopting a full societal perspective. However, we identify a range of ethical, practical and methodological problems that arise when trying to implement a societal perspective. These include a lack of evidence on the opportunity cost of non-health outcomes to calculate net effects, robust methodology to inform trade-offs between health and non-health sector outcomes and the discriminatory consequences of counting productivity effects.

We discuss how these considerations are balanced against the need to consider the value of non-health effects during the technology evaluation and guideline production processes. These are particularly relevant in situations where an intervention yields substantial non-health benefits or are not funded by the NHS, where NICE has flexibility to allow for a wider perspective to be taken. Similarly, decision-making committees are permitted to consider wider effects during the deliberative phase of an assessment when the incremental cost-effectiveness ratio lies within the threshold range normally considered acceptable. We conclude by providing case studies of previous NICE guidance that illustrate how these flexibilities are used in practice and how they influenced committee recommendations.

I**D:** 3395

Author: Cameron Morgan (University of Warwick)

Co-Authors: Cam Donaldson (Glasgow Caledonian University); Emily Lancsar (Australian National University); Stavros Petrou (University of Oxford); Lazaros Andronis (University of Warwick)

Title: Views, obstacles, and uncertainties around the inclusion of children and young people's time in economic evaluations: findings from an international survey of health economists

Abstract: In economic evaluations that adopt a wide, societal perspective, it is important that all salient inputs are valued and accounted for, including people's time spent receiving care. While few would argue that children and young people's (CYP) time is not valuable, attempts to account for this in economic evaluations are rare and inconsistent. To understand why this is the case, we need to first understand health economists' views in relation to CYP's time and its inclusion in economic evaluation. This is the first step in a broader programme of NIHR-funded work that looks into when and how best to value and include CYP's time in economic evaluations of health care programmes.

We planned and carried out an international survey of health economists. We used various approaches to identify potential survey respondents (the survey's sampling frame), we developed a questionnaire that sought to capture respondents' views and practice through close and open-ended questions, we piloted the questionnaire through a series of cognitive interviews with a convenience sample and we e-mailed unique links to the final version of the questionnaire to 1957 individuals in the sampling frame. We received 274 (14%) complete responses and we have just started analysing these using quantitative and qualitative methods.

Messages emerging suggest most respondents (86%) somewhat agree or strongly agree that CYP's time spent receiving care should be considered for inclusion in societal economic evaluations. As possible reasons for not seeing CYP's time typically accounted for in the literature, respondents commonly cite challenges around attaching a value to CYP's time and difficulties in measuring forgone time. Similarly, when asked about future research on the topic, respondents assigned high priority to resolving uncertainties around what value to attach to CYP's time, as well as when and how to incorporate this in economic evaluations.

Presenting this work to colleagues at this stage (pre-publication) will give us an opportunity to discuss our findings, debate their interpretation and focus on messages that are of greatest interest and use to fellow health economists.

ID: 3319

Author: Peter Murphy (University of York)

Co-Authors: Gerry Richardson; Sebastian Hinde (University of York)

Title: Equality between whom? Estimating gradients in lifetime health for the purpose of decision making using individual-level approaches to socioeconomic stratification

Abstract: Introduction: Measuring inequalities in lifetime health is essential to assess the extent of differences and to inform health decision-making. Estimation of gradients in lifetime health, notably quality-adjusted life expectancy (QALE), have largely focussed on index of multiple deprivation (IMD) to categorise the population by socioeconomic position (SEP). Yet, IMD is an area-level indicator of SEP and there are reasons to consider that individual effects on health (such as education or income) may be greater than the corresponding area effects as well as being more attuned to the intervention level. The aim is therefore to estimate gradients in QALE using income and separately education as indicators of SEP and compare the results to those across IMD.

Method: QALE is estimated through combining multivariate mortality rates and utility values by age, sex, and SEP using Sullivan life tables, adapted using the Chiang II method. Mortality rates were obtained from the literature and were based on data provided by the Office for National Statistics for 2011 and 2012. Utility values were estimated using EQ-5D results from the Health Survey for England (HSE). To align with the mortality data, the 2011 and 2012 rounds of the HSE were used, which was based on 20,950 observations. Utility values were estimated using ordinary least squares regression and robustness checks were conducted.

Results: The estimated utility values decreased with increased age, lower educational attainment and lower income. The results of the estimation of the social distribution of QALE revealed an absolute gap of 12.92 QALYs between those with no qualifications and those with degree-level qualifications or higher. The gap was less pronounced across income groups with an absolute gap of 8.07 QALYs between the quintiles with the lowest and highest income. Comparison with the results estimated across IMD quintiles reveals QALE gradients appear steeper across education groups but shallower across income quintiles compared to IMD.

Discussion: Gradients in lifetime health are considerable, yet differ in their magnitude across income, education and IMD. This has implications for decision-makers tasked with stratifying the population for the purpose of intervention delivery and economic evaluation methods that incorporate health inequalities.

ID: 3408

Author: John O'Dwyer (University of Leeds)

Co-Authors: Louise Bryant (University of Leeds); Claire Hulme (University of Exeter); Paul Kind (University College London); David Meads (University of Leeds)

Title: Development of an adapted EQ-5D-3L for adults who have a mild to moderate learning disability

Abstract: Background: Around 1.1 million adults in the UK have a learning disability, living on average 16 years less than the general population. The NHS Long Term Plan (January 2019) recognises learning disabilities as a clinical priority area. Adherence to the UK Research Governance Framework and the Equality Act 2010 requires that, where necessary, reasonable adjustments are made to enable equity of access. Whilst there are clear health inequalities, this population is often excluded from research, and evidence suggests they have difficulty completing questionnaires such as the EQ-5D.

Objective: Using qualitative methods, systematically examine the EQ-5D (3L and 5L) in terms of wording, content, and structure, and develop an adaptation for use with adults who have a mild to moderate learning disability.

Methods: Qualitative cognitive think aloud interviews with carers/advocates of learning disabled adults were undertaken to explore key difficulties experienced with the EQ-5D. Alternative wording, language, and structure, including images, were examined through an iterative design process with focus groups, learning disability reference groups and an expert panel. The acceptability of an adapted EQ-5D-3L was tested through interviews with adults with learning disabilities.

Results: Fourteen interviews with carers/advocates were undertaken. Analysis of interview data followed a framework method. The dimensions and levels within the EQ-5D-3L were deemed appropriate for adults with mild to moderate learning disabilities. Through an iterative design process, a consensus on wording, structure and images was reached and an adapted version of the EQ-5D-3L for adults with mild to moderate learning disabilities was finalised. Results from interviews with 64 adults with learning disabilities demonstrate that the adaptation is better understood and more acceptable to this group. The psychometric properties of the adapted EQ-5D-3L have been assessed and will be reported elsewhere. The EQ-5D-3L adapted for adults with mild to moderate learning disabilities will help facilitate measurement of their health-related quality of life and further research is underway on the potential use of the adaptation for economic evaluations concerning this population.

ID: 3384

Author: Kim Rose Olsen (University of Southern Denmark)

Co-Authors: Line Planck Kongstad (University of Southern Denmark); Nicolai Fink Simonsen (University of Southern Denmark); Jens Søndergaard (University of Southern Denmark); Geir Godager (University of Oslo)

Title: Do physicians respond to risk-adjustment of the capitation payment in mixed remuneration schemes?

Abstract: Mixed remuneration schemes with capitation and fee for service payments holds financial incentives to add patients to the list as well as providing services to listed patients. Risk-adjusting the capitation payment in such schemes may affect the preferred number of patients and the level of services provided, but few studies has assessed the impact of changes in mixed remuneration schemes. In this paper we assess a natural experiment in the Danish mixed remuneration scheme introducing a two-fold risk adjustment with increased capitation for GPs with high share of complex patients (moderate scheme) and additional capitation for GPs in certain geographical areas (intensive scheme). GPs are eligible for additional capitation if the complexity of their listed patients exceeds a threshold, but as the scheme is subject to a national budget constraint some eligible GPs are left without additional payment. We apply difference-in-difference models using these GPs as control for the GPs receiving additional capitation. We find that for the moderate scheme no changes occurred in the number of patients served or in the level of service provision. For this group the additional capitation simply increased the income level of GPs. For the intensive scheme we found that the additional capitation income was offset by reduced activity levels which left the income unchanged. Hence, for this group our results seem to lend some support to the income target hypothesis suggesting that physicians aim at a target income level and adjust effort accordingly.

ID: 3334

Author: Luke Paterson (University of Manchester)

Co-Authors: Elizabeth Camacho; Rachel Elliott (University of Manchester)

Title: The cost-effectiveness of preserving independence in people with dementia

Abstract: Background: As the UK population ages, the costs associated with caring for people with dementia will grow considerably. Little is known about the long-term costs and health benefits of preserving independence of people with dementia in carrying out activities of daily living.

The aim of this study was to use an economic model to explore how effective a hypothetical non-pharmacological intervention would need to be at preserving independence in activities of daily living in order to be cost-effective from the health and social care provider and societal perspectives.

Methods: A state transition model was constructed which included the following health states: low dependence, moderate dependence, high dependence, and dead. Data from a randomised controlled trial of a non-pharmacological intervention for people with dementia (SENSE-Cog), secondary analysis of data from a randomised trial of a pharmacological intervention (the AD2000 study), and published literature were used to derive model parameters. Costs associated with the hypothetical intervention, health and social care resource use, and informal care were included in the model. Health benefit was measured as quality-adjusted life-years (QALYs), derived from the EQ-5D-5L. The time horizon of the model was ten years time to approximate to the life-expectancy of people with dementia. A discount rate of 3.5% was applied to costs and QALYs beyond the first year of the model. One way sensitivity analyses were conducted to explore uncertainty in the model.

Results: When the number of people who progressed to the moderate or high dependence health states was reduced by 30% (compared with no intervention) the incremental cost-effectiveness ratio (ICER) was £27,642/QALY from the NHS and social care perspective and £55,140/QALY from the societal perspective. When the reduction was 40%, the ICERs were £11,209/QALY and £38,691/QALY, respectively.

Conclusion: The results of the model suggest that preserving independence in people with dementia could be cost-effective from and NHS and social care perspective. As dementia progresses and people move into residential care, the burden of care shifts from informal to formal. The results reflect the non-pharmacological nature of the intervention which focused on preserving independence rather than altering the course of dementia progression.

ID: 3389

Author: Sasja Maria Pedersen (University of Southern Denmark)

Co-Authors: Nicolai Fink Simonsen; Trine Kjær; Kim Rose Olsen (University of Southern Denmark)

Title: Use of Machine Learning to support implementation of Personalized Medicine in clinical practice

Abstract: Optimal chronic disease management involves repeated assessment of the risk of disease progression such as monitoring of biomarkers in order to initiate timely changes in the treatment plan. Guidelines for monitoring disease progression are often standardized programs based on a one size fits all that do not take into account individual risk profiles. This may involve futile tests and consequently futile costs. The global 'Choosing Wisely' initiative aims at identifying such futile clinical behaviours advocating for careful considerations before undertaking tests and treatments. The potential of using machine learning (ML) to inform health professionals in these decisions has received little attention.

The aim of this study is to assess the potential of using ML to predict if planned HbA1Cctests for diabetes patient could be avoided. An avoidable test is defined as a test that does not show elevated HbA1c levels.

We use laboratory data for all patients with type 2 diabetes in three out of five Danish regions observed during 2016-19 (app 1 mio tests and 100,000 patients). Past HbA1c measures as well as a range of other clinical test measures (e.g., LDL, HDL, Creatinine, Triglyceride) are used together with detailed health care-, and drug utilization at monthly level allowing for a retrospective time window for each HbA1c measure.

Various ML models (random forest, dense neural network, logistic regression) are used to predict the risk of elevated HbA1c value both today but also within a set of future timeframes (e.g., next year) using data available at the time of the actual measure. Simple simulation methods are used to assess the potential costs savings and from averting futile tests.

Preliminary results indicate that ML models outperform traditional econometric models when it comes to prediction power and more importantly out of sample prediction power. The random forest model achieved an accuracy of 90.27 % for the area under receiver operating characteristic curve.

The simulation results suggest that a risk stratified test program for HbA1c monitoring where tests for the slow progressors are reduced and increased for the fast progressors could decrease the number of futile tests.

ID:

Author: Becky Pennington (University of Sheffield)

Title: How does caring affect physical and mental health? A comparison of cross-sectional and longitudinal analyses

Abstract: The inclusion of spillovers/carer health outcomes in economic evaluations has typically relied on cross-sectional data. This ignores selection into caregiving, therefore assuming that informal/unpaid carers would have the same health-related quality of life (HRQL) as non-carers if their caregiving responsibilities were relieved. My research aims to identify the causal effect of caring on HRQL and consider how this can be included in economic models.

Understanding Society (UKHLS) includes a “caring” module which asks respondents if they provide unpaid care to someone within or outside their household, and for how many hours each week. UKHLS also includes a self-completion SF-12 module which asks respondents about their health – the SF-12 Physical Component Summary score (SF-12 PCS) and the SF-12 Mental Component Summary score (SF-12 MCS) can be derived from this.

I conducted cross-sectional analysis (linear regression models using ordinary least squares) and longitudinal analysis (fixed and random effects transformations) to explore the relationship between caring and SF-12 MCS and SF-12 PCS in UKHLS.

In cross-sectional analysis of wave 10 of UKHLS, controlling for other characteristics (age, sex, race education, employment), carers have statistically significantly worse SF-12 MCS and SF-12 PCS scores than non-carers. SF-12 MCS scores are worse for carers providing >= 20 hours of care per week, and for carers who care for someone within their own household.

In longitudinal analysis of waves 1-10, carers have significantly worse SF-12 MCS scores than non-carers, but the difference between carers and non-carers is smaller than in cross-sectional analysis. When considering caregiving hours, SF-12 MCS is only significantly worse for carers providing >= 20 hours of care per week and not for carers providing <20 hours of care per week (compared to non-carers). The relationship between caring and SF-12 PCS scores is less clear, with some groups of carers appearing to have better physical health than non-carers.

Although the longitudinal analysis in its current form does not prove a causal relationship, it suggests that there is an unobserved effect in the cross-sectional models that means carers have worse mental health, but that this is not solely due to their caring status.

ID: 3336

Author: Hanifa Pilvar (Queen Mary University of London)

Co-Authors: Toby Watt (The Health Foundation)

Title: The Effect of Workload on Primary Care doctors on Referral Rates and Prescription Patterns: Evidence from English NHS

Abstract: In this paper, we investigate the consequences of greater workload on primary care provision. Faced with growing levels of illness, General Practitioner (GP) workload pressures have been rising consistently and there are concerns that understaffing will impact the quality and consistency of primary care provision. We use a detailed data set of pseudonymized patient level records, from 2016 to 2019, provided by Clinical Practice Research Datalink (CPRD). We use a sample of 50 primary care practices in London, serving around 600,000 patients. Using these data we can analyse primary care activity delivered to patients by specific staff and how many staff are active at the practice on a given day. We measure the workload on General Practitioners (GPs) as the number of daily appointments. Primary care outcomes are situational, multifaceted and complex, in our analysis we focus on referrals and prescriptions to quantify the impacts of physician workload on care delivery. These outcomes are vital functions of primary care, used to manage long term and acute illness. GPs had an average of 0.4 additional appointments per absent colleague per day in 2016-2019. Workload is endogenously linked to staffing decisions and hiring practices, which are unobserved in the data. We therefore employ instrumental variable methods to manage the endogeneity problem, using staff absences as an instrument. We find that greater workload leads to fewer referrals being made: a 10% increase in GP workload reduces the probability of referral by 0.07 percentage points, which is equivalent to a 3% reduction. By splitting the sample, we also find that the effect is exacerbated for patients living in deprived areas, patients with more underlying health conditions and for smaller GP practices with fewer assistant and nursing staff. For the impact of staff workload on prescription patterns, the results are mixed. We show that the probability of giving any prescription is reduced by greater workload on average. However, conditional on a prescription occurring, GPs are likely to prescribe a shorter course of antibiotics, while the quantity of opioid drugs per prescription is larger when workload is greater.

ID: 3310

Author: Irina Pokhilenko (University of Birmingham)

Co-Authors: Marie Murphy; Miranda Pallan; Peymane Adab; Emma Frew (University of Birmingham)

Title: Economic evaluation of the national school food standards across secondary schools in Midlands (the FUEL study): a discussion of the strengths and limitations of undertaking health economics research within non-health settings

Abstract: Background. Unhealthy diet is a major risk factor for developing obesity. Schools have been identified as one of the settings to promote healthy eating. The UK government introduced national school food standards (SFS) that prescribe what food needs to be served in schools. SFS were proven to be effective in reducing sugar intake among primary school pupils; however, no such evaluation exists in secondary schools. Furthermore, there is no evidence on the economic impact of SFS. This study will present the economic evaluation conducted alongside the UK Food provision, cUlture and Environment in secondary schooLs (FUEL) study, and offer a discussion on the methodological challenges of undertaking health economics research in non-health settings.

Methods. FUEL was a natural experiment with schools mandated to adhere to the SFS (SFS schools) compared to schools that were not mandated (non-SFS schools). The economic analysis comprised a micro-costing, cost-consequence, and an exploratory cost-utility analyses, from a public sector perspective. Costs of food provision and the SFS were collected from schools; costs of school-based food purchasing were collected from pupils. The outcomes included health-related quality of life (HRQoL), nutritional intake, dental health, and educational performance. Additionally, public data on catering expenditure was incorporated.

Results. Data were collected from 36 schools and 2543 pupils. SFS schools spend slightly less on food provision compared to non-SFS schools. Pupils attending SFS schools had slightly lower HRQoL, marginally better dental health, and slightly worse nutritional intake. SFS schools also performed worse according to the educational outcomes. However, there were no clear trends, and the results of the exploratory cost-utility analysis were largely uncertain. There were large amounts of missing cost data despite repeated collection attempts.

Discussion. Overall, the study did not find clear evidence of the economic impact of SFS in secondary schools. Furthermore, the difficulty of collecting cost data in schools was a major challenge which affected the accuracy of the results. This paper will offer insights into the appropriateness of using primary data collection methods for complex interventions in non-healthcare settings. It will discuss the trade-off between information accuracy and the resources required to collect that information.

ID: 3392

Author: Refaya Rashmin (University of York)

Co-Authors: James Lomas; Mark Sculpher; Marta Soares (University of York)

Title: Examining the methods to estimate the marginal productivity of NHS expenditure

Abstract: A growing literature exists that seeks to estimate the causal effect on mortality of variations in NHS expenditure by local area in England. These studies have used an instrumental variable (IV) regression approach to address endogeneity due to unobserved confounding and reverse causality. These endogenous sources of variation are brought on by the NHS's local resource distribution practices.

Meanwhile, developments in the econometrics literature indicate concern about the use of IV approaches, even when standard model diagnostic tests have been implemented.

The first study to estimate the mortality effects of NHS expenditure used IVs based on socio-economic variables drawn from the census. Although the empirical tests results from using these IVs were not concerning, there was minimal theoretical support for their exogeneity. More recent work has used a new set of IVs, which have more theoretical support but have only been subjected to standard diagnostic tests that are no longer considered sufficient.

This paper critically examines the analysis undertaken with this newer approach using 2014/2015 data. A sensitivity analysis is conducted that investigates the robustness of mortality elasticities in cancer and circulatory diseases outcome models to violations of the required exclusion restriction assumption.

Our findings indicate there is no clear direction of bias in the resulting mortality elasticities. Further, other model specifications that use different approaches to investigate the existence and influence of unobserved confounding reveal no obvious pattern. To this end we attempted a placebo regression, inclusion of regional fixed effects, and adjustments to the instruments to respond to specific potential issues.

The analysis conducted in this paper cannot rule out that the IV approach is invalid. However, given the use of established standard methods for which there is always some residual uncertainty about identification which is rarely explicitly explored but is here- the results of this study can perhaps be seen as some reassurance that the original IV regression models have not provided inappropriate evidence regarding the marginal productivity of NHS expenditure. Of course, further work using entirely different approaches is to be welcomed and might help to reduce some of the evident uncertainty in the estimates.

ID: 3354

Author: Giovanni Righetti (University of Verona)

Co-Authors: Paolo Pertile (University of Verona); Simona Gamba (University of Milan)

Title: Strategic Response to External Reference Pricing

Abstract: In years of growing pharmaceutical spending, numerous efforts have been put in place to contain the disproportionate expansion of costs. One of the main paths followed by European Regulators, in evaluating the adoption of new innovative medicines, is represented by the reliance on external reference pricing (ERP) schemes. In particular, the national Regulator can set a basket of reference countries with the aim of deriving a benchmark price in the negotiations for new innovative medicines. The ERP criterion, when it is widely adopted (as it is the case of the EU), link decisions made in different countries, both explicitly and implicitly. However, policies regarding pharmaceutical regulations are typically studied at the country level (Brekke et al., 2009; Kaiser et al., 2014; Windmeijer et al., 2006), with few exceptions (Stargardt and Schreyogg, 2006).

The paper focuses on the inclusion of countries in the ERP reference set of a national Regulator that adopts an ERP scheme. In particular, we investigate the impact on such reference countries that is due to their inclusion in the Regulator's ERP reference set. In fact, pharmaceutical manufacturers might exert more effort in negotiating higher prices in these reference countries once they are included. In this way, manufacturers would be able to start from a better position vis-a-vis the Regulator, since the latter would have relatively higher benchmark prices in its reference set. We call it strategic effect.

Our theoretical predictions are confirmed by a DiD empirical strategy that exploits the pharmaceutical pricing regulation change occurred in Germany in 2011, which included ERP features (the AMNOG bill). We used the IMS pricing database of cancer drugs approved by EMA between 2007 and 2017 in 25 OECD countries. We show a strategic effect equal to 5.48% in those countries that have been included in the German reference set. This suggests that manufacturers have, in fact, exerted more effort in bargaining with foreign countries to affect German prices, in line with the prediction of Garcia Marinoso et al. (2011). Our work highlights how the design of domestic pharmaceutical regulations has an impact that goes beyond national borders.

ID: 3383

Author: Daniela Rodrigues (Imperial College London)

Co-Authors: Noemi Kreif (University of York); Ara Darzi (Imperial College London); Mauricio Barahona (Imperial College London); Erik Mayer (Imperial College London)

Title: A 'digital NHS front-door' in England: implications for age and socioeconomic-related inequalities of utilisation of general practice and hospital unplanned care

Abstract: The UK National Health Service experienced a substantial technological change in response to the COVID-19 pandemic. In English general practice, most patients can now use an online platform to submit a written request, in addition to calling or visiting the practice in person. The easy-to-use online access route is expected to encourage patients to seek care in general practice when in need, rather than using emergency care services or foregoing care altogether. However, there are concerns that the online channel could also exacerbate potential health care inequalities because the elderly and those from lower socioeconomic groups might not have the digital skills or resources to use it. Using data from over 2.5 million registered patients across 282 practices in Northwest London, we employ a difference-in-differences identification strategy by exploiting the differential timing of implementation of online platforms between 2019 and 2020 to estimate the impact of the online channel on the total volume, and age and socioeconomic-related inequalities of utilisation of general practice and hospital services. We estimate that the online access route led to 91 (95% CI, 53-129) additional patient care interactions per 1000 registered patients in general practice, with 79 (95% CI, 46-113) additional online messages per 1000 registered patients, but large uncertainty in the estimate of the effect on synchronous interactions. When restricting our sample to patients aged 60+ years and from the top 30% most income-deprived areas, we find an increase of 53 (95% CI, 1-106) synchronous interactions per 1000 registered patients. There is no evidence of an impact on the number of non-urgent attendances to emergency departments or potential preventable hospital admissions, and this is also the case across age and socioeconomic groups. Our preliminary findings suggest that the online access route led to an increase in patient care activity in general practice, without negative impacts on the elderly and those from lower socioeconomic groups. Practices with a 'digital front-door' seem to be effective at managing patient requests from multiple channels which means the online access route has the potential to improve access to general practice for all registered patients.

ID: 3419

Author: Andrea Salvati (University College London)

Co-Authors: Gabriella Conti (University College London; Institute for Fiscal Studies); Dylan Celestino D'Mello (University College London); Yichen Yu (University of Oxford)

Title: The Impact of Health Visiting on Children's and Mothers' Outcomes: Evidence from the 2017-2020 Public Health Grant Cuts

Abstract: Universal Health Visiting in the UK is one of the oldest public health programmes in the world, established in the mid-1850s as a public health service focusing on problems of sanitation and epidemics. Nowadays, health visits are provided universally to all mothers in the UK between gestation and the second birthday of the child. Despite being more than 150 years old, a rigorous evaluation of the impact of health visiting is still missing. The recent expenditure and staff cuts applied to health visiting, especially since the transfer of responsibility for the 0-5 public health services to the local authorities (LAs), has made such evaluation of paramount importance. In this paper, we use unique data collected under the Freedom of Information Act (FOI) to document the state of the health visiting workforce at LA level, its recent trends and consequences. The FOI data, which provide the number of staff members by pay grade and skills level in each LA of England, is then merged with LA-level information sourced from government departments on maternal and child outcomes.

Our preliminary results show a steady decrease in the health visitors' workforce between 2016 and 2019, although with substantial heterogeneity across LAs in workforce size, composition, and related caseloads. Staff redeployment due to the pandemic between 2020 and 2021 caused a change in teams' composition in many LAs, with health visitors being replaced by less expensive clinical skill mix staff. We also document that a higher presence of health visitors in the LA is positively correlated with the percentage of mothers and children who received a visit; on the other hand, a higher caseload is associated with lower numbers of visits performed. Finally, preliminary results from fixed effects regressions show that reductions in the health visiting workforce have negative impacts on children's immunization rates, and their socio-emotional and cognitive development.

In the next steps of this study, we plan to assess the causal link between health visiting spending and children's and mothers' outcomes, by exploiting the post-2015 cuts to the Public Health grant together with data on planned funds allocations across LAs.

ID: 3359

Author: Chris Sampson (Office of Health Economics)

Co-Authors: Hareth Al-Janabi (University of Birmingham); Louise Proud (University of Bristol); Stefan Lipman (Erasmus University Rotterdam); Werner Brouwer (Erasmus University Rotterdam)

Title: Do we need animal health economics?

Abstract: Animal health is important to humans, to animal welfare, and of significant consequence to the global economy. It is also intertwined with human health, as demonstrated by zoonotic disease, antimicrobial resistance, and other existential crises. Yet, the health economics profession has paid little attention to animal health. In this narrative review and discussion paper, we explore whether there is a need for animal health economics. Our objective is to shine a light on this neglected topic and share some preliminary insights to inform future research. First, we specify the nature of the problem, outlining how animal health economics raises similar and distinct challenges from (human) health economics. To this end, we highlight various contexts for animal health decision-making, including companion animals, agriculture, and wildlife, and describe their relevant differences. We discuss different normative, positive, and practical considerations from a health economics perspective. These issues are derived partly from audience questions at a recent webinar, and we use them to illustrate connections with existing bodies of research within (human) health economics. Second, we explore four case studies for current research questions in the economics of animal health. These are i) treatment evaluation, ii) disease management, iii) resource allocation, and iv) market design. For each, we summarise the policy context as it is developing and draw on relevant research from economics, policy studies, and veterinary medicine and epidemiology. Third, we specify where- and how-health economists might add the most value, including methods for understanding market failures, health state valuation, cost-benefit analysis, and policy evaluation. In some cases, there are existing research efforts on which health economists can build, such as analyses of pet insurance markets and the development of quality-adjusted life years for animals. In view of this, we propose a tentative research agenda. Finally, we specify some key stakeholders and collaborative subdisciplines with which health economists might engage. The study of animal health economics should involve numerous disciplines beyond veterinary science and economics, with important questions for political science, ecology, and ethics. We conclude by arguing that health economists should consider dedicating more energy to research on animal health.

ID: 3328

Author: Paul Schneider (University of Sheffield)

Co-Authors: Katharina Blankart (University of Duisburg/Essen); John Brazier (University of Sheffield); Ben van Hout (University of Sheffield; Open Health); Nancy Devlin (University of Melbourne)

Title: Using the Online Elicitation of Personal Utility Functions (OPUF) approach to derive a patient-based EQ-5D-5L value set: a study in 122 patients with rheumatic diseases

Abstract: Background: Decision makers increasingly recognise the importance of patient preferences in health care and policy decision making. To formally incorporate the patients' perspective into economic evaluations, QALY-weights can be based on the preferences of patients, instead of or in addition to the general public. However, traditional preference elicitation methods, such as DCE or TTO, usually require sample sizes of several hundred or thousand participants. This can limit their applicability in patient populations, where recruiting a sufficient number of participants can be challenging.

The objective of this study was to test a new method, called Online elicitation of Personal Utility Functions (OPUF), to derive an EQ-5D-5L value set from a relatively small sample of patients with rheumatic diseases from Germany.

Methods: OPUF is a new type of online survey that implements compositional preference elicitation techniques. Central to the method are three valuation steps: (1) dimension weighting, (2) level rating, and (3) anchoring. From the responses, a personal EQ-5D-5L utility function can be constructed for each participant, and a group-level value set can be derived by aggregating model coefficients across participants.

A demo version of the EQ-5D-5L OPUF survey can be accessed at https://valorem.health/eq5d5l.

Results: A total of 122 rheumatic disease patients from Germany completed the OPUF survey. Participants reported various health conditions, including rheumatoid arthritis, psoriasis arthritis, and ankylosing spondylitis, and were mostly female (n=111;91%). Our results suggest that the survey was generally well received; most participants completed the survey in less than 20 minutes.

We were able to construct a personal utility function for each participant, and on the aggregate group level, we derived a plausible, logically consistent EQ-5D-5L value set. The precision of mean estimates was comparable to other valuation studies with much larger sample sizes. Resulting utility values ranged from 1 (for state 11111) to -0.32 (for 55555).

Conclusions: Our findings demonstrate that OPUF can be used to derive an EQ-5D-5L value set from a relatively small sample of patients. Even though the method is still under development, we think that it has the potential to be a valuable tool and to complement traditional preference elicitation methods.

ID: 3387

Author: Nicolas Schreiner (CSS Institute for Empirical Health Economics; University of Basel)

Co-Authors: Linn Hjalmarsson (University of Bern; CSS Institute for Empirical Health Economics); Christian P.R. Schmid (CSS Institute for Empirical Health Economics; University of Bern)

Title: Determinants of Generic Substitution by Patients

Abstract: Given the potential of generic drugs to substantially reduce health care expenditures, policymakers have implemented various programs to promote and incentivize generic substitution. Nonetheless, the ultimate purchase decision over the specific prescription drug often rests with patients themselves.

To study the little-known factors influencing these consumer choices, we analyze roughly 140 million drug purchases by approximately 1.8 million clients of the largest health insurer in Switzerland over a ten-year period. The Swiss context is particularly suited to investigate generic substitution as the regulatory setting allows us to differentiate several factors.

We first analyze how drug price differentials, i.e., relative and absolute, influence patients' choices under different cost contribution schemes. Costs to patients solely depend on the accrued medical expenditures in the current year: a) full (until the yearly deductible is reached), b) partial (co-insurance rate of 10% until a further 700 CHF), c) none (after exceeding both the deductible and coinsurance). Additionally, the co-insurance rate rises to 20% for original drugs if at least three sufficiently cheaper generic alternatives exist. Our results indicate that out-of-pocket price savings play a surprisingly small role in explaining drug choices.

Even given the financial incentives, patients need to be aware of generics and the reduced costs thereof. Within a subset of roughly 12 million claims of 30 active chemical substance groups, the health insurer has sent approximately 300,000 letters to clients after purchasing one of these 30 original drugs, informing them about available cheaper alternatives. The mostly random timing of the individual letters allows us to study the causal impact of information in a quasi-experimental setting. We find that the likelihood of switching to a generic alternative almost doubles among clients who have already received a letter before their next drug purchase.

With the myriad of individual-, drug-, and provider-level factors that also potentially influence generic drug substitution, we make use of the recent advances in causal machine learning by implementing generalized random forests to identify complex heterogeneities in generic substitution probability. Our paper thus provides valuable insights for the design of incentive schemes attempting to promote generic drug uptake by patients.

ID: 3385

Author: Victoria Serra-Sastre (City, University of London)

Title: Safety at work and intention to quit the NHS workforce

Abstract: NHS job vacancies remain at record levels and an increasing number of staff are leaving the NHS. Several factors have been identified as key determinants for improved retention rates of nurses and doctors, mostly related to job characteristics (such as flexibility, promotion, shift patterns and overtime) and a very limited role of wages influencing decisions to quit. Safety at work is an aspect that has received little attention as a driving force in the dropout rates among NHS workforce. Recent figures indicate that approximately 15% of NHS staff had experienced abuse while at work (NHS Staff Survey, 2021). Given the prevalence of abuse and the consequences it may have on staff' wellbeing, in this paper we aim to examine the impact of working in an (un)safe environment and the intention to quit the NHS workforce. We employ data from the NHS Staff Survey, a rich dataset that records the experience and views of staff working in the NHS. The survey collects information on staff working conditions, satisfaction, and respondent's characteristics. For the purpose of this paper, we use data from 2018 to 2021 of NHS employees surveyed in acute trusts. Our main dependent variables, all related to the respondent's intention to quit, are indicator variables that reflect the intention to leave the organisation, intention to look for another job and job replacement. The explanatory variables of interest reflect a range of indicators that capture whether the respondent has experienced violence or harassment at work. We also explore the impact that exposure to unsafe environments has on the health of those individuals. The results suggest that experiencing violence from patients, managers or colleagues increases the likelihood of quitting their job and a negative effect on the health of employees. We also run sub-sample analysis to examine differences across gender, occupational group and age, which we use as proxy for seniority.

ID: 3400

Author: Michele Siciliano (University of Leeds)

Co-Authors: Ruben Mujica-Mota (University of Leeds)

Title: The role of smoking status on costs and quality of life outcomes of primary hip and knee replacement in routine practice

Abstract: Introduction: Previous research has shown that smoking is associated with an excess risk of medical complications, use of analgesia, and mortality following joint replacement surgery, but the implications for NHS costs and patient health-related quality of life outcomes are unknown. This study used linked data from primary and secondary care and patient reported outcome measure (PROM) records of patients undergoing total hip replacement (THR) and total knee replacement (TKR) in routine English NHS practice to estimate cost and utility differences between smokers, non-smokers and ex-smokers.

Data and Methods: Linked data from CPRD, Hospital Episode Statistics, PROMs and ONS mortality on all patients aged 18 years and older with a diagnostic code for primary THR and TKR in CPRD recoded between January 1 1995 and January 28 2017 were used. Patients had to have been registered with their practice for at least 12 months and had available data on smoking status at the time of primary surgery for inclusion in the analysis. We analysed differences by smoking status in post-operative EQ-5D utility outcomes, 12-month costs of contacts with primary care services, use of medications, referrals to secondary care, inpatient admissions, and survival, adjusting for baseline differences in patient characteristics using propensity score methods.

Results: There was a total of 131,946 patients with available data on smoking status included in the analysis, 60812 underwent THRs and 56,212 TKRs, with 42% of patients being smokers or ex-smokers for the treatment group. We found substantial excess costs in smokers vs. non-smokers related to complications 6 months after surgery, including ischemic heart disease, lower respiratory tract infection, myocardial infarction, although estimates for TKR were imprecise. We estimated the impact of medical complications on medication use and post-operative EQ-5D utility change in each arm.

Discussion: Our study presents evidence of the excess costs and loss of quality of life from medical complications experienced by smoker patients following primary total hip and knee replacement. We discuss the contribution of our findings to informing model-based cost-effectiveness analyses of hip and knee replacement operations.

ID: 3407

Author: Peter Sivey (University of York)

Co-Authors: Panos Kasteridis; Luigi Siciliani (University of York)

Title: Waiting time prioritisation for hip replacement

Abstract: Aims and Background: Waiting times for elective treatments have been slowly increasing in England in the last decade, and increased sharply during the COVID-19 pandemic. One policy to reduce the impact of waiting times on patients' health is to prioritise patients according to need. This study investigates the extent to which patients with higher need, as measured by pre-operative health, are prioritised on the list and wait less than other patients. We also test whether socioeconomic status affects waiting times.

Data: We use inpatient and outpatient data from the Hospital Episodes Statistics database linked with Patients Reported Outcomes Measures data to: identify elective admissions of patients who underwent a hip replacement surgery between April 2015 and March 2021; determine inpatient and referral-to-treatment waiting time; obtain information on pre-operative health of the condition reported prior to surgery and on various patient socioeconomic and clinical characteristics as well as on prior utilisation. Pre-operative health is measured through the Oxford Hip Score, and the EQ-5D.

Methods: We employ linear and log-transformation regression models to estimate the effects of pre-operative health, income deprivation and other factors on waiting times. We run separate models for the pre-pandemic year and the first year of the pandemic to compare the extent to which prioritisation of patients changed during COVID-19.

Results: Our preliminary results provide evidence of inpatient waiting time prioritisation. Patients with better pre-operative health waited significantly longer relative to those with worst pre-operative health. In the pandemic year, the volume of hip replacements fell dramatically, waiting times doubled and the gradient on pre-operative health became significantly steeper. Our results also suggest a deprivation gradient, which became remarkably steeper in 2020 with patients in the most deprived quintile waiting more than 21 days longer than those in the least deprived quintile.

We contribute to the literature in different ways. We analyse the referral-to-treatment waiting time in addition to inpatient waiting time; we compare prioritisation pre- and post- pandemic; and we test whether prioritisation relates to pre-operative health related to the hip or also other domain of general health.

ID: 3399

Author: Wei Song (University of York)

Co-Authors: Panos Kasteridis; Rowena Jacobs (University of York)

Title: Estimating the Effect of Acute Physical Health Shocks on Depression in Community-Dwelling Older Adults

Abstract: Background: Physical health and mental health have been strongly linked with one another. In this study we aim to establish and measure causal impact from acute physical health shocks to depression by exploiting the exogenous variation of an acute physical health shock and assessing the subsequent mental health outcome of depression in community dwelling older adults covered in the 9 waves of the English Longitudinal Study on Ageing (ELSA) survey.

Methods: We formed 8 observation periods using the ELSA data and captured individuals who experienced the first ever episode / diagnosis of acute myocardial infarction (AMI), stroke, and cancer as cases. We matched controls who have never experienced any of these three conditions / diagnoses based on demographic and social-economic status, self-report of health, and health profile and behavioural factors at observation period level, and generated difference in differences (DiD) estimators for the 9-item Center of Epidemiological Studies Depression Scale (CES-D) with and without caseness cut-off.

Results: Nearest neighbour propensity score matching resulted in good balancing of observable covariates of around 3,500 cases and their matched controls across the 9 waves. The average treatment effect for the treated (ATT) for experiencing an acute physical health shock showed a 36% increase in risk (7.86% percentage point increase, p0.1). Models using various matching techniques returned similar estimates. This established causal impact of the experience of an acute physical health shock on risk for depression, and motivates further research in equity of this effect, and its impact on mental health service utilisations.

ID: 3339

Author: Jannis Stockel (Erasmus University Rotterdam)

Co-Authors: Victoria Serra-Sastre (City University London); Alistair McGuire (London School of Economics); Giulia Faggio (City University London)

Title: Staff Retention and A&E Efficiency: Evidence from the English NHS

Abstract: Healthcare systems in many developed economies are faced with the challenge of low retention rates among their workforce. The English NHS is no exception and experiences an increasing rate of staff joining or leaving the service. We study the relationship between staff retention and hospital efficiency in the context of Accident and Emergency (A&E) departments in the English NHS. While a broad literature considers the role of (non-)monetary factors that determine labour supply and retention of doctors and nurses there is limited empirical evidence quantifying the consequences of low staff retention for hospital performance. We focus on A&E departments due to their critical role in the wider NHS system as an access point and gatekeeper for hospital care. Further, A&E performance is likely to be susceptible to changes in staffing, where staff experience and teamwork in a high-pressure environment requires quick decision-making to allocate and deliver care efficiently. To explore the relationship between staff retention and A&E performance we use a combination of public information sources at the NHS Trust level on the A&E workforce, workforce retention (joiners, leavers, and stability-indices), patient case-mix, and local area and hospital trust characteristics. Our range of outcome measures capture multiple dimensions of A&E performance, namely timeliness of care, patient experience, readmission rates, and mortality rates for A&E admits. Using fixed-effects models we find that high levels of staff retention are associated with better outcomes across all dimensions, decreasing waiting times and time to treatment and assessment, as well as improving some mortality outcomes and lowering re-admission rates. Our results indicate that low retention rates are indicative of a decrease in overall hospital performance, further underscoring the potential negative effects of ongoing staffing shortages in the NHS. In ongoing work, we explore different identification strategies to obtain causal estimates of the impact of retention on performance measures.

ID: 3378

Author: Francisca Vargas Lopes (Erasmus University Rotterdam)

Co-Authors: Sara R. Machado (London School of Economics)

Title: Medicaid expansion and the mechanics of increased access to organ transplantation

Abstract: Objectives: Medicaid expansion effects on coverage and access are well documented in many health care domains, but certainly depend on the system, disease and treatment-specific factors. In this paper, we estimate the effect of Medicaid expansion on the unique ecosystem surrounding organ transplantation, by harnessing within-state variation in the policy implementation over time.

Methods: We use the outcome regression Callaway & Sant'Anna staggered difference-in-differences estimator and data from the Organ Procurement and Transplantation Network (OPTN), that captures the universe of solid organ transplant candidates in the United States of America between 2010 and 2018. We explore transplant candidates' full clinical journey and study Medicaid expansion effects in four outcomes. First, we measure the number of transplant candidates added to the waiting list per capita, to capture effects on coverage. Second, we measure Medicaid transplant candidates as a fraction of total Medicaid enrollees, as a proxy for changes in access to healthcare. Third, we measure the proportion of Medicaid transplant candidates among all added to the waiting list, to learn about change in ecosystem payer mix. Last, we measure Medicaid transplants as a proportion of Medicaid waiting list additions, to capture the actual access to transplantation. We run the analyses above for all organs together and study heterogeneous effects by each organ allocation policy (heart, lung, kidney, and liver).

Results and Discussion: Our findings point towards an effect of Medicaid expansion on coverage of transplant candidates, with an increase in waiting list additions of 0.145 per 100,000 population (SE:0.050), 38% of the its pre-treatment mean. We do also observe changes in the health insurance payers, with Medicaid expansion states having over 34% higher proportion of Medicaid patients among new transplant candidates (estimate:2.946, SE:1.180). Coefficients for the two other outcomes are small and estimated with large uncertainty. Therefore, we conclude that there is limited evidence of an increase in access to care among Medicaid beneficiaries; but that organ allocation policies are not systematically discriminate across payer sources. The latter is consistent with the efficiency of deceased donor organ allocation algorithms, allowing the increase in waitlisting to be converted in access to transplantation.

ID: 3398

Author: Mary Ward (University of Bristol)

Co-Authors: Michael Grayling (University of Newcastle); James Wason (University of Newcastle); Nicky Welton (University of Bristol); Abdul-Lateef Haji-Ali (Heriot-Watt); Hawre Jalal (University of Pittsburgh); Howard Thom (University of Bristol)

Title: A value of information analysis of a multi-arm multi-stage trial design for a randomised controlled trial of surgical wound dressings

Abstract: Background/Aims: Multi-arm multi-stage (MAMS) trial designs have several advantages over conventional trial designs as they allow interventions to be discontinued early for futility or efficacy. MAMS designs can achieve the same level of accuracy and precision whilst requiring fewer patients to be exposed to potentially less effective treatments. A lower expected sample size (ESS) can also lead to a reduction in the cost of trials, and faster delivery of results. We used Value of Information analysis to compare the cost-effectiveness of MAMS and conventional designs in the evaluation of wound dressings following general surgery.

Methods: We developed a decision tree model to compare the costs and quality of life benefits resulting from different wound dressing types (Simple, Exposed, Glue), which differ in the risk of surgical site infections and costs. Relative effectiveness of preventing surgical site infection was based on a network meta-analysis of 22 studies. We computed the expected value of sample information (EVSI) for MAMS designs with stopping rules for futility and efficacy, and with different ratios of patients across stages. We compared the MAMS designs with a conventional single-stage design and with standard sample size calculations. The maximum sample size was set to 26,750, which was the required size of a conventional design using standard sample size calculations. We compared the EVSI with trial costs to calculate expected net benefit of sampling (ENBS) and identify cost-effective designs.

Results: Stopping for either futility and efficacy separately each give decreases in ESS, 12% and 21% respectively, but a larger decrease in ESS can be obtained by stopping for both futility and efficacy together (34%). The reduction in EVSI for MAMS designs with a lower ESS is small (EVSI range across all designs is £131.36-£132.78). Furthermore, ENBS (£824.8m-£833.6m) was driven by population EVSI (£828.7m-£837.7m) rather than trial costs (£3.5m-£4.4m). Reducing ESS therefore had little impact on ENBS. Changing the ratios of patients across stages had little effect on the ESS and EVSI.

Conclusions: MAMS trial designs can achieve similar value of information and cost-effectiveness to conventional designs, while exposing fewer patients to unnecessary randomization and with lower total cost.

ID: 3371

Author: Max Warner (Institute for Fiscal Studies)

Co-Authors: Carol Propper (Imperial College); George Stoye (Institute for Fiscal Studies)

Title: The Effects of Pension Reforms on Physician Labour Supply: Evidence from the English NHS

Abstract: Rising life expectancies have raised concerns about the sustainability of generous defined benefit pension schemes around the world, including in the public sector. As a result, many developed countries have introduced reforms to make public sector pension schemes less generous. However, critics of these reforms suggest that reducing the generosity of schemes effectively reducing pay will lead to the loss of staff from affected sectors. This paper provides new evidence on the impact of such reforms on the labour supply of publicly employed senior doctors (known as consultants) in England, and the consequences for hospital output. We use the universe of administrative hospital payroll records from the English National Health Service to study the impact of a reform in 2015 that moved staff from a final salary pension scheme to a less generous career average scheme. Exploiting the staggered roll-out of the new scheme across narrowly defined date of birth groups, we show that the labour supply of senior doctors increased as a result of the reform, both on the intensive and extensive margin. We also show that hospitals that experienced larger increases in labour supply as a result of the reform delivered more outpatient, but not inpatient, activity. These results show that shifts to more affordable pension schemes do not necessarily reduce the labour supply of existing staff.

ID: 3331

Author: Aki Tsuchiya (University of Sheffield)

Co-Authors: Tara Wickramasekera; Becky Field (University of Sheffield)

Title: Equally-distributed equivalents and inequality aversion in health and wellbeing

Abstract: Background: Achieving higher and similar levels of health and wellbeing for everybody should be the goal of publicly funded healthcare systems. However, when there are trade-offs between efficiency and equality, difficult choices must be made. Previous studies eliciting inequality aversion in life years across socioeconomic groups typically failed to account for links between socioeconomic status and health, violating the symmetry assumption of the social welfare function.

Aims: (1) To elicit levels of aversion to inequality from a UK general public sample. (2) To do so by identifying the equally-distributed equivalent (or the level of the policy outcome of interest that, when distributed equally, is as good as the current unequal distribution) for three separate policy outcomes: a monetary measure of overall wellbeing (equivalent income) across identical individuals; healthy life-years across otherwise identical individuals; and healthy life-years across the rich and poor. (3) To achieve the above by controlling for the other aspects of life to allow the calculation of inequality aversion independently of the symmetry assumption.

Methods: Ten online discussion groups of around five participants are held, which ask participants to imagine advising people living on an imaginary island. Participants are presented with a series of pairs of distributions where one of the distributions is more-but-unequal (e.g. average healthy life-years of 69, with a 16-year gap across groups) while the other is less-but-equal (e.g. average of 67, with no gap across groups). The latter level reduces as the exercise progresses (viz. 67, 65, 63...). At each step, participants are asked which of the paired distributions would be better for the island. The point at which a participant is indifferent between the more-but-unequal distribution and a less-but-equal distribution indicates the equally-distributed equivalent for this participant. Participants discuss their choices and reasoning in groups, after which they complete the trade-off task individually, online. The exercise is repeated for the three policy outcomes.

Results and Conclusion: Data collection is ongoing. The paper will focus on the development of the tool, quantitative results, and early findings from qualitative data.

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ID: 3318

Author: Beth Woods (University of York)

Co-Authors: James Lomas, Mark Sculpher, Helen Weatherly, Karl Claxton (University of York)

Title: Achieving dynamic efficiency in pharmaceutical innovation: identifying the optimal share of value, the payments required and evaluating pricing policies

Abstract: It has been argued that cost-effectiveness analysis of branded pharmaceuticals only considers static efficiency, neglects dynamic effects and undermines incentives for socially valuable innovation. Most analysis does not consider the longer term value beyond the period of intellectual property protection when cheaper generic products start to enter. However, accounting for long-term value immediately poses the question of what share of this total value should be offered to manufacturers to incentivise future innovation and the value that it generates.

The purpose was to develop a feasible, practical and evidence based approach to pharmaceutical pricing policies and payment mechanisms to achieve dynamic efficiency. A review and synthesis of the evidence of how the quantity and quality of innovation responds to levels of payment was incorporated within a coherent framework that identifies the static and dynamic benefits and costs of offering manufacturers different levels of reward. We account for the long-term value of health technologies beyond patent expiry, while distinguishing the consumption value of health and the health opportunity costs associated with health care expenditure. We show how this analysis can be generalised to other welfare arguments, including the implications of accounting for any producer surplus that might be retained.

We are able to replicate key results from the literature as special cases, but show, based on the best available evidence, that the optimal share of the long-term value of a new product accruing to the manufacturer is roughly one quarter. This result is insensitive to how the value of pharmaceuticals to patients is measured and valued and is only moderately sensitive to the inclusion of any producer surplus that might be retained. The application of this analysis to a sample of 12 NICE technology appraisals suggests that, in most cases, the share of value offered to manufacturers and the price premium paid by the NHS were higher than would have been optimal. As a consequence, a payment and pricing policy based on evidence of how the quantity and quality of innovation responds to payment would offer considerable dynamic benefits to a public health objective and a broader view of welfare.

ID: 3309

Author: Huasheng Xiang (Lancaster University)

Co-Authors: Viviana Albani (Newcastle University); Nasima Akhter (Durham University); Louis Goffe (Newcastle University); Amelia Lake (Teesside University); John Wildman (Newcastle University); Heather Brown (Lancaster University)

Title: Does using planning policy to restrict new takeaways reduce childhood overweight, obesity and inequalities?: A quasi-experimental analysis of Gateshead's Supplementary Planning Document between 2015-2020

Abstract: Background: North-East England has a high prevalence of childhood obesity, where 29.1% of children in year 6 were obese in 2020/21. Local authorities are responsible for improving population health, delivering on limited resources. In 2015, Gateshead Council in the North-East of England introduced planning guidelines with the aim of promoting healthier environments. This prohibited the conversion of a premise to a hot-food takeaway, though existing outlets were not affected. Our prior research found that implementation was associated with a reduction in the density of fast-food outlets, but the health implications were unknown.

Aim: To examine if changes in the takeaway food environment are associated with decreases in childhood overweight and obesity health inequalities.

Methods: Data on childhood overweight and obesity were collected at the Middle Super Output Layer (MSOA) level from the National Child Measurement Programme for 2011-2020. Data on the number and type of food outlets were collected from Food Standard Agency Food Hygiene Rating Scheme for 2012-2020. Data on the Index of Multiple Deprivation 2015 were collected from the Office of National Statistics. We analysed the data at the MSOA level by area deprivation and employed a quasi-experimental method, a difference-in-difference approach, to compare changes in childhood overweight and obesity rates between MSOAs in Gateshead and MSOAs in five other local authorities in the North-East of England which did not have implement planning tools restricting new takeaways.

Results: Our results showed a statistically significant reduction of 2.7% (95% CI: -5.3% to -0.2%) in year 6 overweight in the second most deprived quartile of MSOAs in Gateshead compared with the control groups. We did not find statistically significant changes in other deprivation quartiles of MSOAs. This may be because of heterogeneity in the number of takeaways in each decile of deprivation.

Conclusion: Our findings show that limiting new takeaways using planning tools may have helped contribute to reducing health inequalities in childhood weight status in Gateshead. As the food environment is dynamic it is important to consider how this policy could be applied by other local authorities as a potentially cost-effective approach to tacking high obesity rates.

ID: 3409

Author: Chuanzi Yue (University of Bristol)

Title: Price and Welfare Spillovers of Social Insurance Expansion: Evidence from the US

Abstract: Introduction: Hot debates are happening in the US regarding how and whether to expand Medicaid and Medicare; developing countries are striving to increase their social insurance coverage rate following the WHO's promotion of "Universal Health Coverage". Due to budget or political constraints, many proposed reforms only aim at a subset of the population. Understanding the impact of social insurance expansion on the welfare of the unintended population will help policymakers to evaluate similar programmes. Measuring the price elasticity of demand for drugs is also an academic challenge that has long been in the spotlight of economic research.

Methods: Exploiting the Medical Expenditure Panel Survey and the introduction of Medicare Part D, a US prescription drug insurance targeted at the above-65 (age) US citizens, I construct an event study to identify the programme's impact on the below-65s' drug prices. As a robustness check, the uninsured above 65s' market share of a drug's molecular class before Medicare Part D, as a proxy of a drug's exposure to Part D, is used to conduct a continuous difference-in-differences analysis. To study the impact of Part D on the below 65s' welfare, I estimate a Hanemann (1984)-style discrete-and-continuous demand model. The model enables me to distinguish between the extensive (whether to consume) and the intensive margin (how much to consume) of drug consumption, which is lacking in the existing literature. Following Huang and Rojas (2013, 2014) and Dubois (2022), I estimate the market share of the outside option by the parametric feature of the demand model. Compensating variations are then computed based on the estimated demand model.

Results: Between 2006-2010, Part D reduced the prices of drugs by 10% for the below 65s on average, with brand-name drugs reduced less than generic drugs. The average price elasticity of demand for drugs is -1.10 for the below 65s. Generally, the Part-D-led price reduction resulted in a welfare increase equivalent to 20.3 USD per individual per year, nearly all of which came from the intensive margin. The uninsured and poor below 65s benefited more from the price reduction than their insured and non-poor counterparts in compensating variation.