HESG2022 Leeds – 5th to 7th January 2022

P A P E R A B S T R A C T S

1. **Leana Diekmann (London School of Economics and Political Science, Office of Health Economics), Chris Sampson (Office of Health Economics), Andrew Street (London School of Economics and Political Science).**

   The Mental Health Effects of Higher Education Enrolment: Longitudinal research of being a higher education student using the UK Household Longitudinal Study from 2014-19.

   Background: Poor mental health is among the UK's top three morbidity causes. With symptoms increasingly occurring in Britain's younger and higher education student population, scholars need to determine higher education enrolment's role to inform policy and design appropriate mental wellbeing programmes. Research: Using data from the UK Household Longitudinal Study (UKHLS) from 2014-19, this study investigates the mental health effects of being a higher education student in a population of 15 to 30 year-olds. Methods: The analysis focuses on three general and self-assessed mental health outcome measures: caseness (GHQ-12 scores), mental functioning (SF-12 scores) and mental wellbeing (life satisfaction scores). It employs panel-data (i.e., pooled regressions and fixed-effects (FE)) and quasi-experimental (i.e., fuzzy regression discontinuity design (FRDD)) methods to resolve endogeneity concerns and several checks to investigate effect robustness. Results: Pooled regressions indicate that being a higher education student increases the probability of caseness and poor mental functioning by 3.03% and 2.62%, respectively, but has no significant impact on mental wellbeing. The FE and FRDD results suggest no statistically significant effects. Robustness analyses support these results, although the FRDD's 12-month bandwidth estimation suggests that higher education enrolment significantly increases caseness probability by 23.2%. Discussion: The study finds no causal effect of being a higher education student on aggregate mental health indicators. Although the findings align with the previous econometric research on (higher) education's mental health effects, these studies are not entirely comparable due to retrospective assessments with divergent educational definitions and general, working and/or retired population foci. Conclusion: This study is the first to investigate the mental health effects of higher education enrolment, serving as a starting point for subsequent studies. Future research needs to explain why higher education students report poor(er) mental health levels than their age-equivalent peers, as higher education enrolment does not seem to be a significant driver. Further, it should investigate higher education enrolment's impact on specific mental-disorder indicators (i.e., Beck Depression Inventory) whilst employing alternative econometric techniques (i.e., propensity-score-matching-difference-in-difference) to establish sounder estimates.

2. **Christopher Lübker** (University of York), Tim Doran (Department of Health Sciences, University of York). Richard Cookson (Centre for Health Economics, University of York)

Evaluating the Health Impacts of Universal Infant Free School Meals: A Distributional Cost-Effectiveness Analysis

Background: Since 2014, free school meals (FSMs) have been provided to all Key Stage 1 children (age 4/5-7/8 years) in English state-funded schools through the Universal Infant Free School Meal (UIFSM) programme. Providing FSMs to children in primary school is often advocated not only on humanitarian and educational grounds, but also as a way of reducing childhood obesity and improving lifelong eating habits. However, the long-term health impacts of universal compared to means-tested FSMs for different social groups are unknown. Aim: This study aims to assess: (i) the cost-effectiveness of UIFSMs from a long-term health care perspective, based on the direct health impacts of bodyweight changes; and (ii) the distributional health equity impacts and trade-offs of UIFSMs. Methods: Lifetime incremental costs and health effects were calculated using 10 Markov cohort models (MCMs) to simulate lifetime bodyweight transitions for each sex-socioeconomic status (SES) quintile group. Conditional transition probabilities were calculated using the 1958, 1970, and Millennium UK cohort studies, along with the English Longitudinal Study of Ageing. Distributional bodyweight treatment effects were obtained from Holford and Rabe's (2020) UIFSM impact report. Distributional cost-effectiveness methods were applied to assess the cost-effectiveness and health inequality impacts of UIFSMs compared to means-tested FSM delivery from a health perspective. Results: Under central assumptions, UIFSMs lead to 6,386.67 incremental QALYs, justifying health care co-funding of £95.8m per year at a cost-effectiveness opportunity cost threshold of £15,000/QALY. The programme has larger net health benefits for the middle SES quintiles than the most and least advantaged, but is overall slightly inequality-reducing for Atkinson inequality aversion parameter levels under ε=15.95, assuming health care co-funding of £95.8m per year. Cost-effectiveness results and health inequality impacts varied considerably with treatment effect fadeout assumptions, with scenarios ranging from 287 to 10,789 incremental QALYs. Discussion: Direct health benefits of UIFSMs could potentially justify up to one-fifth of UIFSM costs from a health sector perspective, if the educational and humanitarian benefits are funded by the education sector. Further evidence from long-term follow-up studies is required to address uncertainty about UIFSM treatment effect fadeouts.

3. **Marco Mello** (University of Surrey), Giuseppe Moscelli (University of Surrey, IZA). Melisa Sayli (University of Surrey). Ioannis Laliotis (University of Peloponnese, City University of London)

Gone with the wind: the impact of the 2016 national contract reform on junior doctors' retention within the English NHS

In August 2016, the UK government imposed a new contract on NHS Junior Doctors, affecting both their working conditions and pay levels. This new contract involved an increase in basic pay, but also more weekend working paid at the standard weekday rate. This work studies the impact of the 2016 Junior Doctor Contract (JDC) on Junior Doctors' retention in the NHS, by means of a Difference-in-Difference (DiD) analysis with heterogeneous treatment intensity. We construct a monthly employee-level panel, by using Electronic Staff Records (ESR) from August 2009 to July 2018. The ESR data allow us to observe the employment history of Junior Doctors and whether they left the NHS for longer than 6 months, which is our primary outcome of interest. Because the new contract was

imposed to all Junior Doctors employed in the NHS, we examine the retention of trainee doctors based on their predetermined exposure to the consequences of the new system. We define a continuous treatment intensity variable quantifying the amount of unsocial work that each Junior Doctor was exposed to until August 2016. This measure is based on the share of basic salary received by Foundation Doctors within the same Trust in recompense for anti-social work, which protects the estimation strategy from potential identification threats. Intuitively, this approach identifies Junior Doctors that were more used to weekend working and more penalized by the new contractual terms. We find that the 2016 JDC significantly reduced the retention of Junior Doctors. On average, a 10% increase in the ratio between anti-social supplement pay and basic salary was associated with a 0.2% increase in the monthly probability of leaving the NHS. Furthermore, specialties in which weekend working is ordinary (e.g. A&E) experienced a greater loss of trainees compared to those in which much of the work takes place over a 5-day week (e.g. Psychiatry). These findings highlight the relevance of working conditions for the progression in the medical career. They are also important for designing future policy interventions and contractual agreements aimed at improving the retention of human capital in the English NHS.

4. **Luis Filipe** (Lancaster University), Eduardo Costa, Nova School of Business and Economics. Francisca Vargas Lopes, Erasmus University Rotterdam. Joana Gomes da Costa, University of Porto. João Vasco Santos, University of Porto. Sara Almeida, Imperial College London
Opening to deaths: A discrete choice experiment about Covid-19's policy preferences in Portugal

The Covid-19 pandemic has disrupted our daily lives. The need to control the sanitary situation has led governments to implementing several restrictions with substantial social and financial impacts. This paper aims to understand how people prioritize their income and social restrictions, as well as society's level of education and poverty, relative to the immediate health effects of the pandemic. Specifically, we estimate the level of sacrifice that individuals are willing to make to reduce the Covid-19 death burden. A Discrete Choice Experiment is used to estimate such trade-offs in the Portuguese population. Two blocks were used with eight choice sets each. Over 2,500 answers were collected from January to March 2021. In our sample, the number of Covid-19 related deaths is the attribute with the largest negative effect on the respondents' utility, followed by poverty, income, education, and social restrictions, respectively. Estimates suggest that individuals would be willing to sacrifice 20% of their income to save 47 lives per day during the first 6 months of 2021. For the same period, they would also accept 20% of school population to become educationally impaired to avoid 25 daily deaths; a strict lockdown to avoid 23 daily deaths; and 20% of the population to become poor to save 100 individuals, daily. Group heterogeneity analysis shows that, in our sample, women are more sensible to deaths than men in every domain studied. There are no significant differences in preferences by region, across age groups, by home office status or by education level. Nevertheless, people with children both below and above school age are less willing to accept social restrictions to save lives, comparing to people without children, with only older children or only younger children. The opposite happens to households in the 1100 to 1500 euros income group, which are more easily persuaded to abdicate of everyday life freedom to save lives than other income groups. These findings suggest that there was support to the measures taken at that time, that included closing schools, a strict lockdown and reducing the economic activity, if these led to saving lives.

5. **David Glynn** (Centre for Health Economics, University of York), Susan Griffin, Centre for Health Economics, University of York. Nils Gutacker, Centre for Health Economics, University of York. Simon Walker, Centre for Health Economics, University of York

Methods to quantify the most important parameters for model updating and distributional adaptation

Distributional cost effectiveness analysis (DCEA) is a method that allows analysts to provide information not just on overall population health impact from an intervention but also its distributional consequences. This is particularly important given the policy attention paid to inequalities in health between groups with different income, wealth, race, gender and geographical location. To conduct DCEA, parameters in a decision model must be modified to reflect the differences between the groups of interest (e.g. the intervention may be more effective in less deprived groups). This represents greater data requirements compared to performing an analysis of overall impacts and it can be challenging or impossible to find appropriate information to modify every parameter in a model. In this paper we propose a method which quantifies the importance of each parameter to the distribution of health consequences between groups of interest. Decision makers could use this method when interpreting DCEA results to assess whether the most important parameters have been modified to reflect differences between groups. It also provides analysts with information to guide parameter identification efforts. When distributional information on important parameters does not exist in the literature, this metric can justify more substantial research investments by estimating the benefits of additional research e.g. de novo empirical work or expert elicitation. We first formalise the health impact of including equity relevant differences in parameters in decision models. This quantifies the relationship between a change in an individual parameter and changes in the distribution of health between groups of interest. We then use this to develop a practical metric which can indicate which parameters have the greatest impact on the distribution of health between groups of interest. By assuming that that the impact of marginal changes in each parameter on health outcomes is linear, we use a linear meta-modelling approach to estimate the importance of each parameter. This can be quickly calculated based only on information given in the probabilistic sensitivity analysis. We then apply this method to a case study and interpret the results. Finally, we discuss limitations and extensions of this approach to relax the linearity assumption.

6. **Dheeya Rizmie** (Imperial College London)

Does pollution disrupt sleep? Evidence from a pedestrianisation policy in Paris

Air pollution is a growing concern worldwide, posing one of the greatest threats to public health and economic growth worldwide. Road transportation is one of the largest contributors of poor air quality, accounting for more than one quarter of ambient air pollution in urban areas. With over 90% of the global population currently living in areas of poor air quality, assessing its relationship with indirect determinants of health, such as sleep, is crucial in further understanding and accounting for its wider societal and economic implications. Several policy initiatives have been implemented in Paris to address the

pollution concerns of the city. The pedestrianisation process began under the car-free scheme called Paris Respire. To identify the causal effect of air pollution on sleep, I use personalised health tracker data and exploit a unique campaign, (Paris Respire), in Paris that intends to temporarily reduce traffic emissions across the city, in a spatial difference-in-differences framework. The study first evaluates the impact of this policy on traffic flows in Paris. Then exploits a similar identification to understand the implications on sleep. Subsequently, this allows for the understanding the influence of short-term pollution shocks on individuals' quality of sleep and sleep deprivation across Paris between 2015 and 2019 (N=938,386). Preliminary results see a decrease in vehicular traffic in areas with the policy, and the surrounding areas, suggesting that Paris Respire reduced traffic-related air pollution. Preliminary results also see an increase in the number of minutes of sleep among individuals in areas with the policy. Subsequently, preliminary analysis suggests that a reduction in pollution associated with Paris Respire confers improved sleep durations.

7. **Heather Brown** (THL: Finnish Institute of Health & Welfare), Emily Breslin (Bresmed)

Comparing health service usage of different immigrant groups with native Australians: Evidence from the Household Income and Labour Dynamics Survey

Background: Migration levels are increasing as our world continues to become more connected. In Australia, migrants comprise almost 30% of the total population. As migrant numbers are increasing and becoming a larger proportion of the population, it is both an essential human right and necessary for continued economic growth that migrants receive the same high-quality healthcare as the host population. Research suggests that migrants across Europe potentially face barriers to accessing non-emergency medical care such as routine check-ups or preventative screenings leading to higher attendance for emergency care. In this paper we explore the determinants of health service usage across different migrant groups to compare with the native Australian population. We compare the determinants across a younger age group 16-50 and compare this with an older age group 51+ to understand differences in health service usage across the life course. Methods: We use data from the Household Income and Labour Dynamics of Australia survey from waves 9, 13, and 17 which contain information on health service usage. Our outcome variables are number of GP appointments over the last 12 months and number of nights in hospital. The key determinants of health services usage we included in our analysis were marital status, educational attainment, area level disadvantage, employment status, gender, and rurality. We estimated linear regression models for service usage. All models were estimated separately by birth region and for younger and older age groups. Wald type tests were used to compare differences between the birth regions. Preliminary Results: Younger migrants (aged 16-50) have a lower use of health services compared to the host population. Whilst older migrants (51+) show similar or increased use compared to native Australians. Migrants from Sub-Saharan African are most at risk of facing barriers to health service usage reporting lower usage across different determinates. Poor English skills are a significant barrier to health service usage. There are statistically significant differences between self-assessed health and service usage by birth region. Conclusions: Barriers to service usage vary by country of origin of the migrant and age. Future analysis will explore differences in usage by country of origin.

8. **Simon McNamara** (BresMed; University of Sheffield), Aki Tsuchiya (University of Sheffield), John Holmes (University of Sheffield)

   Does the UK-public's willingness to prioritise disadvantaged socioeconomic groups differ by type of health-gain? A person-trade-off study

   Distributional cost-effectiveness analysis (DCEA) is a new form of CEA which enables economists to capture the impacts of interventions on inequalities in health between social groups. Existing QALY-based variants of DCEA treat all incremental QALYs in the same way, irrespective of whether they are made up of life-expectancy gains or quality-of-life gains. We conducted an online choice-experiment to test whether this approach is consistent with the preferences of the public. We hypothesized that the UK-public are more willing to prioritise disadvantaged socioeconomic groups with lower lifetime health over advantaged socioeconomic groups with higher lifetime health if an intervention improves life-expectancy rather than if it improves quality-of-life. Just over 1,500 members of the UK-public participated. Respondents were randomised to pairwise person-trade-off questions about hypothetical interventions that would provide one of ten health-gain-types, including life-expectancy or different quality-of-life dimensions. The sample were willing to prioritise disadvantaged groups with lower lifetime health for all tested health-gain types; however, they were more willing to do so for interventions that improve life-expectancy rather than quality-of-life. The preferences of the UK-public may not be consistent with DCEAs that treat all types of QALY gains equally.

9. **Laurie Rachet-Jacquet** (The Health Foundation), Stephen Rocks (the Health Foundation), Giulia Boccarini (the Health Foundation), Anita Charlesworth (the Health Foundation), Omar Idriss (the Health Foundation), Ruth McConkey (the Health Foundation)

   Long-term projections of health care funding needs

   Objective: In early September 2021, the government announced its budget for health and social care in England. In the absence of a detailed model to assess population needs, it is unclear whether the funding will be sufficient to meet future demands for care. This paper estimates long-term funding needs by modelling demand and costs of delivering care through to 2030/31. Methods: We obtain the rate of health care utilisation across a wide range of service areas (primary, community, secondary, drug prescribing and maternity care) by age, gender and comorbidity (where available) using data from HES, CPRD, and other publicly available datasets. We use these utilisation rates to project future demand for care using population projections and assuming a continuation of trends in comorbidity. We cost future demand using 2018/19 unit costs for each service area and projecting forward based on assumptions around staff pay and productivity. In addition, we model the impact of additional policy pressures, related to meeting waiting time standards or tackling COVID-19 related pressures. To reflect uncertainty around policy choices, we present two scenarios corresponding to different policy ambitions (e.g. around staff pay or the backlog). We estimate the implications of these scenarios in terms of capacity and workforce. Results: Our results indicate that meeting the demand arising from changes in population and comorbidity and meeting performance standards implies additional funding needs over and above government plans set out in the NHS Long Term Plan. In the longer term, to 2030/31, NHS funding would need to increase by between 3.1% and 3.5% in real terms depending on

the level of policy ambition. Further, our projections imply that the NHS workforce could need to grow by up to a fifth by 2024/25, on top of growth to reduce current staffing shortages. Discussion: This set of funding projections will be updated regularly to inform decision makers. Possible improvements include: better estimates of morbidity and the association with activity; modelling changes in the mix of available services; and a fuller description of unit cost pressures.

10. **Christine Halling** (VIVE (1)), Claire Gudex (2). Anders Perner (3,4). Catherine Elgaard Jensen (5). Dorte Gyrd-Hansen (6). 1. VIVE – The Danish Center for Social Science Research, Herluf Trolles Gade 11, 1052 København K, Denmark. 2. Department of Clinical Research, University of Southern Denmark and OPEN - Open Patient data Explorative Network, Odense University Hospital, Region of Southern Denmark. 3. Department of Intensive Care, Copenhagen University Hospital, Rigshospitalet, Copenhagen, Denmark. 4. Centre for Research in Intensive Care (CRIC), Copenhagen University Hospital, Rigshospitalet, Copenhagen, Denmark. 5. Danish Centre for Health Economics (DaCHE), Department of Public Health, University of Southern Denmark, Denmark

Public vs. patient health preferences: Protocol for eliciting an EQ-5D-5L value set for patients in intensive care

Based on stated preference data elicited from a representative sample of the general population. However, having a severe disease may alter a person's health preferences, which may affect the appropriateness of treatments and practices. This study aims to model a value set for EQ-5D-5L based on preferences elicited from a sample of adult patients who have survived an acute stay in a Danish hospital intensive care unit (ICU) and to compare those to the preferences of the general population. To attempt to understand the potential differences between the ICU patients and the general population, we will aim to investigate the heterogeneity in the ICU patients' preferences. Methods and analysis: The present study generates an EQ-5D-5L value set for ICU patients based on a sample of 300 respondents enrolled in two RCT studies at Danish ICUs. To elicit the preferences from ICU patients we will use composite time trade-off following the most recent EQ-5D valuation protocol. This includes interview training, computer-assisted face-to-face interviews and quality control measures. The patient-based EQ-5D-5L valuations will be compared with the EQ-5D-5L valuations from the general Danish population. To understand the potential differences between the two valuations, potential underlying determinants of the ICU preferences will be investigated. We will analyse demographic characteristics, time since the ICU stay (to investigate adaptation and stable preferences), self-reported HRQoL, willingness to trade off longevity for HRQoL, health state reference dependency, and dimensions where the patient has gained experience in terms of the patient's own illness. Discussion: If the study finds no significant differences between the ICU patients' and public preferences, a more general involvement of patient valuations in our QALY calculations is unlikely to impact markedly on the conclusions drawn in economic evaluations. To the extent that patient-based and public-based preferences differ, this study will provide valuable input to the discussion of the current practice.

11. **Andrew Ibbetson** (Department of Health Services Research & Policy, London School of Hygiene & Tropical Medicine), Archie Walters,1 Andrew Briggs1. 1- Department of Health Services Research & Policy, London School of Hygiene & Tropical Medicine

Cost-Effectiveness of Care Pathways post-COVID19 Infection: The Importance of HEAPs, HEMPs and Conceptual Modelling

Understanding how to optimise NHS support for individuals post-COVID19 infection to maximise quality of life and deliver services which are cost-effective is critical to personalised, high quality, value for money care. Patients whose infection initially required hospitalisation are likely to experience a greater proportion of burden from so-called 'long-COVID' and therefore require more follow-up care and services. Nevertheless, a significant proportion of cases are managed in the community. Using data from the Post-HOSPitalisation COVID19 (PHOSP-COVID) study and a new study of people with long-COVID who did not require hospitalisation (openPROMPT), we describe our plan to develop a generic cost-effectiveness model for COVID19 capable of assessing vaccination strategies, acute therapies and health service care pathways. We propose a two-phase model to represent COVID care pathways following initial infection, comprising of (1) a decision-tree, to represent care in the first 12 months including community managed care and hospitalisation/subsequent health care provision; and (2) a lifetable analysis, to capture lifetime impacts. We describe both a Health Economics Analysis Plan (HEAP) and a Health Economics Modelling Plan (HEMP) built around a conceptual model of COVID19 infection and delivery pathways to emphasise the importance of a pre-specified approach to model development. We go on to describe how the generic model can be used to assess cost-effectiveness of a range of policy responses to the COVID19 pandemic as well as to explore equity issues in a distributional cost-effectiveness analysis at the geographical, community and individual level.

12. **Murong Yang** (Health Economics Research Centre, Nuffield Department of Population Health, University of Oxford), Cathy Creswell: Department of Experimental Psychology, University of Oxford; Claire Carson: National Perinatal Epidemiology Unit, Nuffield Department of Population Health, University of Oxford; Mara Violato: Health Economics Research Centre, Nuffield Department of Population Health, University of Oxford

Child mental health and income gradient from early childhood to adolescence: Evidence from the UK

Background: Research suggest that children from low income families are likely to have poorer mental health than their more affluent peers. This study aims to investigate the relationship between family income and mental health problems from childhood to adolescence in the UK, potential variations with age, and the mechanisms that may underpin the relationship. Methods: Using data from the UK Millennium Cohort Study, child mental health was measured by the Total Difficulties Score (TDS), Internalising and Externalising subscales, all derived from the Strengths and Difficulties Questionnaire (SDQ) at ages 3, 5, 7, 11 and 14 years. Family income was operationalised as permanent income, with lagged transitory income used as robustness check. A secondary exposure was frequency of poverty. Cross-sectional analysis using multivariable logistic regression was conducted at each survey age, based on the Grossman health production function. Results: Results were available for 8096 children, the prevalence of mental health problems (TDS) ranged from 4.6% to 11.1% across all ages. Unadjusted results indicated significant protective effects of higher family income on the likelihood of the child having poorer mental health in all age

groups. The relationship weakened after adjustment for confounding and potential mediating factors, and marginal effects of income on TDS were -0.024(SE=0.009), -0.014(SE=0.004), -0.009(SE=0.006), -0.048(SE=0.010) and -0.041(SE=0.011) at age 3, 5, 7, 11, and 14 years, respectively ($p<0.001$ in all age groups except age 7 where $p=0.163$). Adjustment for poor maternal mental health and low mother-to-infant attachment reduced the strength of the association between income and child mental health. Fully adjusted model suggested an increased independent effect of poor maternal mental health on children's mental health as children grew older. Conclusions: While family income is strongly associated with a child's mental health, much of this effect is explained by other risk factors such as maternal depression, and therefore the direct effects are relatively small. This may suggest that policies targeting income redistribution may reduce child mental health inequalities, and also be beneficial to the wider family, reducing the prevalence of other associated risk factors. This is even more important as the ongoing COVID-19 pandemic pushes more families into poverty.

13. **Kirsty Garfield** (Health Economics Bristol, University of Bristol), Joanna Thorn (Health Economics Bristol, University of Bristol). Sian Noble (Health Economics Bristol, University of Bristol). Samantha Husbands (Health Economics Bristol, University of Bristol). Will Hollingworth (Health Economics Bristol, University of Bristol)

Development of a brief, generic, modular resource-use measure (ModRUM): piloting with patients

Background: Bespoke self-report resource-use measures (RUMs) are commonly developed or adapted for each new RCT. Consequently, RUMs lack standardisation and validation is rarely conducted. Using a rigorous process, including consultation with health economists and patients, we have developed a new generic RUM. ModRUM includes a concise core healthcare module, designed to be included in all trials, and depth-adding questions, which can replace core questions as needed. The aim of this study was to test the acceptability, feasibility, and criterion and construct validity of ModRUM. Methods: Patients who had a recent appointment at their GP practice were invited to complete ModRUM (core module or core module with depth questions), a characteristics form and the EQ-5D-5L. Acceptability was assessed via response rates and questionnaire completion time. Participant feasibility was assessed by reviewing issues evident in participants' responses and question completion rates. Researcher feasibility was assessed based on data cleaning requirements and the ability to identify unit costs. Construct validity was tested via known-group analyses, using Wilcoxon rank-sum and Kruskal-Wallis tests, and convergent validity, using a generalised linear model. Criterion validity was tested by comparing ModRUM results with GP records. Sensitivity, specificity, and agreement using Lin's concordance correlation coefficient (pc) were estimated. Results: 100 patients participated from five GP practices in the South-West of England. Acceptability was higher for the core module (20% versus 10% response rate). Question completion rates were high across both versions (>90%). It was feasible to clean data and source unit costs. Some support was observed for construct validity, with results suggesting that healthcare costs differ dependent on the number of long-term conditions ($p<0.05$) and are negatively associated with health-related quality of life (p0.83), while specificity varied (0.33-0.88). There was a good level of agreement for GP contacts and costs, and prescribed medication costs ($pc>0.6$). Discussion: This study provided first evidence of the acceptability, feasibility, and criterion and construct validity of ModRUM. Further testing

is required within RCTs and with groups that were less well-represented in this study. We discuss the strengths and challenges of using a brief, generic, patient-reported RUM.

14. **Jannis Stöckel** (Erasmus School of Health Policy & Management (Erasmus University Rotterdam)), Pieter Bakx, Erasmus School of Health Policy & Management (Erasmus University Rotterdam). Bram Wouterse, Erasmus School of Health Policy & Management (Erasmus University Rotterdam)

    Adaptation to Severe Health Shocks

    A large proportion of the population experiences a major health shock during their life. How these impact subjective expectations and outcomes is poorly understood but has important consequences given the role subjective beliefs play in individual decision making. While many studies suggest that individuals adapt to health shocks their insights are often wanting due to limited information on the nature of health shocks and the underlying health of individuals before and after their occurrence. We explore whether individuals adapt to ill health by combining surveys with administrative data on hospital admissions for heart attacks and strokes. This allows us to explore adaptation using a novel approach that accounts for many factors unobserved in previous studies. We combined the Dutch Health Monitors of 2012 and 2016 with detailed administrative data on various dimensions (medication/healthcare use, socio-economic status, etc.) to identify a sample of 13,000 heart attack and 9,000 stroke patients that provide survey responses on subjective outcome measures at different relative time points to their health shocks. We exploit the exogenous nature of these shocks and the variation in their timing in combination with a doubly robust event-study design. Experiencing a heart attack or stroke has large immediate negative effects on subjective health. Especially self-assessed health decreases substantially in the year after a heart attack or stroke is experienced. Despite these substantial initial differences, the magnitude of these effects decreases quickly with increasing time away from the respective health shock. While individuals experience an increased objective burden of disease over time their self-assessed health returns to pre-shock levels. Our findings suggest that even after a severe health shock like a heart attack or a stroke, individuals adapt their self-assessed health within a short period of time. Further adaptation occurs rather quickly within a few years after the health shock and if the onset of a heart attack or stroke is associated with longer-term physical health problems. In ongoing analyses, we aim to further disseminate these patterns by exploring whether adaptation differs across subgroups and whether adaptation correlates with observed risky or preventive health behaviors.

15. **Igor Francetic** (University of Manchester)

    Selection on moral hazard in the Swiss market for mandatory health insurance: Empirical evidence from Swiss Household Panel data

    Objectives: Moral hazard and adverse selection have been widely studied in relation to health insurance coverage choices. A related concept is that of selection on moral hazard: the tendency to select a specific coverage according to heterogeneity in behavioural responses to health insurance (i.e. utilization “slopes” associated with different levels of coverage) rather than different utilization levels. However, the extent of selection on moral

hazard in different health insurance markets remains an open empirical question. Our goal is to assess it in the context of the Swiss managed competition system, where insurers offer homogeneous insurance plans on a strictly regulated marketplace under a universal health insurance mandate. Methods: We use a mix of data from the Swiss Household Panel and from publicly available regulatory data. To measure the extent of selection on moral hazard, we use the (log) number of doctor visits as a proxy for healthcare utilization and study the response to unexpected injury or illness, which we argue to be plausibly exogenous conditionally on contemporaneous and lagged individual characteristics. To overcome the inherent endogeneity between coverage choice and risk "types" (i.e. adverse selection), we employ an instrumental variable approach. We use both specifications to compare responses of individuals switching deductible to those maintaining the same level of coverage and test the robustness of our results to various alternative specifications. Results: On average, individuals switching from highest to lowest deductible levels consumed more healthcare compared to individuals who had already selected the same lowest deductible level. The difference in conditional averages between these two groups suggests responses to the health shock around 30 percent stronger for the group of switchers. Analogously, individuals switching from lower to higher deductible showed milder responses to the health shock compared to "high-risk" individuals who had already selected the lowest coverage possible. Discussion: Our results support the mechanisms of selection on moral hazard, confirm predictions of simple models of selection on moral hazard in health insurance, and match results of previous contributions in terms of its magnitude. We discuss potential implications for the regulation of the Swiss mandatory health insurance market.

16. **Simon Walker** (Centre for Health Economics, University of York), Emma Frew, Institute of Applied Health Research, University of Birmingham. Susan Griffin, Centre for Health Economics, University of York. Mark Sculpher, Centre for Health Economics, University of York

Understanding the normative judgements and estimable quantities associated with different approaches to multi-sectoral economic evaluation

Different approaches have been proposed for economic evaluations to inform decisions about public health policies and interventions with substantive impacts beyond health. These include universal outcome measures, impact inventories, cost-benefit analysis, cost-consequence analysis and social return on investment analysis. Underlying each method is a set of normative judgements and a series of estimable quantities related to the evaluation and to the institutional arrangements under which an intervention would be implemented. Normative judgement about what is of value include determining the relevant outcomes, their relative worth and how their distribution in the population affects their worth. Estimable quantities include the outcomes and costs of the interventions under evaluation as well as broader evidence around the system such as the benefits forgone when expenditure falls on different budgets. However, the normative judgements underlying the approaches may not always be clear to decision makers. Similarly, the appropriateness and validity of the estimable quantities may not be transparent. Much of the confusion may arises from the use of monetary values, where measured costs may become confused with social values. This paper aims to set out clearly the underlying normative judgements behind the different proposed approaches to multi sectoral economic evaluation, as well as to make explicit the estimable quantities underlying them. We distinguish value judgements including

which outcomes may be relevant for different government agencies, which outcomes have social value beyond their impact on economic activity, and alternative means of establishing value such as trading outcomes for other outcomes versus trading outcomes for income. We also examine the aggregation of individual versus societal values for population level outcomes. We distinguish estimable quantities such as resources utilised, prices, and the opportunity cost of resources. For example, differentiating transfers, charges and tariffs, quantities of resources, and the marginal productivity of public expenditure in different sectors. We hope that by being explicit about these, decision makers and analysts can judge the appropriateness of the approach used to inform decisions. We also highlight the evidential challenges in how estimable outcomes are operationalised and measured and how these could be addressed going forward.

17. **Nils Gutacker** (University of York), David Parkin (City, University of London & Office of Health Economics, London). Yuanyuan Gu (Macquarie University, Sydney)

    Case-mix adjustment of PROM data to assess provider performance

    Patient-reported outcome measures (PROMs) data are increasingly used to compare the performance of health care providers in terms of their patients' improvements in health-related quality of life (HRQoL); for example to inform patients choice of hospital, or to make payments conditional on health gains. Provider comparisons need to be adjusted for differences in the composition of patients that providers treat: a process known as case-mix adjustment (CMA). PROMs data are frequently obtained through multidimensional HRQoL questionnaires such as the EQ-5D or the SF-6D. The prevalent approach of CMA of PROMs data is to estimate a case-mix adjustment model that relates patient characteristics directly to PROM instrument summary scores and to use this model to generate provider-specific outcomes in terms of changes in adjusted scores. However, this approach has limitations. For example, it does not make full use of the information provided by the underlying instrument responses, and it generates results that are specific to the weighting procedure used to generate summary scores from multidimensional HRQoL data. In this paper we present the results of a simulation study that compares two different CMA methods for EQ-5D data: (i) the usual summary score (SS) approach and ii) a novel domain response (DR) approach suggested by McCarthy (2016, JHE), in which responses on each HRQoL domain are first adjusted for patient characteristics, and then aggregated into summary scores. We investigate the statistical properties of both methods, how well they can identify provider performance, and which context-specific factors should guide the choice of methodology in applied research. Our preliminary findings suggest that the DR approach outperforms the SS approach when the number of patient characteristics or the effect of these characteristics on HRQoL is large. However, we also encounter situations where the DR approach generates predictions that are biased away from the true estimate by a constant factor. We cannot explain this behaviour and would value input from HESG meeting attendees. We will make simulation code available alongside the meeting paper to encourage discussion and to allow attendees to explore the behaviour of the DR approach for themselves.

18. **Johanna Zenzes** (university of Cologne)

    Uncovering Sources of Heterogeneity in the Effect of Maternal Smoking on Birth Weight and APGAR Score

It is a matter of debate, whether smoking is more harmful to newborn health in some pregnancies than others. Only few studies have examined the possibility, that effects differ with mother's characteristics, but provide unclear causal interpretation. Understanding possible drivers of heterogeneity is important in identifying those mothers most at need for intensified care and assistance with smoking cessation. Therefore, we want to identify mother's characteristics that are driving factors of heterogeneity in the effect of smoking on newborn health and evaluate their impact on newborn health. Using recent advances in the intersection of econometrics and machine learning, allowing treatment effects to differ with observables, individual treatment effects can be estimated. However, detection of driving factors remains unclear. We estimate heterogeneous treatment effects using a causal forest, a model based on random forests, able to cope with unobservable counterfactuals. Using a decomposition approach which makes use of counterfactual distributions, we decompose the distribution of estimated treatment effects. This way, we can isolate differences in effects that are only driven by one single variable, while keeping other characteristics comparable. We apply this framework to decompose the effect of maternal smoking on birth weight (standardized for gestational age and sex of newborn) and the 5-minute Apgar score. Using a comprehensive data set based on information abstracted from US birth certificates, we find strong modifying effects for mother's age, parity, BMI and weight gain for the effect of smoking on birth weight. Increased age and parity amplify the effect of smoking on birth weight. Being overweight or obese and increased calorie intake can alleviate the adverse effect of smoking on birth weight. Considering the 5-minute Apgar score decomposition for mother's age show similar patterns as for birth weight. Increased mother's age amplifies the effect of smoking on Apgar score. For BMI and weight gain, we cannot find any positive effect of increased weight or calorie intake on the effect of smoking on Apgar score. Thus, suggesting that birth weight increased through overweight and excessive weight gain does not result in better infant health.

19. **Cherry Law** (London School of Hygiene & Tropical Medicine), Laura Cornelsen, London School of Hygiene & Tropical Medicine. Andrés Sánchez Pájaro

Do healthy diets cost more?

Healthy foods are widely reported to be more costly than unhealthy foods. This is often reported as one of the key barriers to a healthy and nutritious diet. Recently published UK National Food Strategy demonstrated that highly processed foods, that tend to be unhealthy, are on average three times cheaper per calorie than healthier foods. However, price per calorie is not ideal for assessing the relative cost of healthy and unhealthy foods as healthier foods are typically lower in fat, sugar and refined carbohydrates and thus have fewer calories. Alternative to this would be to look at the differences in the cost of diets between those consisting mainly of healthy foods and those containing predominantly less healthy foods. We conducted a cross-sectional analysis of the cost of diets depending on a share of unhealthy foods using a large representative British household purchase panel of foods and beverages brought home in 2017. The Nutrient Profiling Model was applied to classify food and drink items as healthy or unhealthy. We estimated a quadratic association between the share of energy purchases from unhealthy items and the annual expenditure on food and beverage per household member. The results showed that buying a basket consisting predominantly of healthy foods and beverages is likely to be less expensive than a

mixed basket. We found that, on average, the highest per household member expenditure on food (i.e. highest costing diet) occurred when 38% of the energy purchases came from unhealthy foods and drinks. While this analysis provides new insights on the relative costs of healthy and unhealthy diets, it does not yet identify the causality between the healthiness of the food basket and the total household food expenditure due to concerns about reverse causality between the food expenditure and share spent on unhealthy items. We are currently including data from earlier years to construct a panel dataset of monthly food purchases. This will allow us to explore the use of a lagged explanatory variable as an IV with Arellano-Bond estimator to strengthen the analysis.

20. **Chris Sampson** (Office of Health Economics), Dimitrios Kourouklis, Mikel Berdud

    Identifying cost-effectiveness thresholds: a review of factors for a new theoretical framework

    Objectives: Resource allocation decisions in health technology assessment (HTA) often use a cost-effectiveness threshold (CET). The prevailing approach to setting a CET relies on estimating the relationship between health expenditures and outcomes to elicit the shadow price of a quality-adjusted life year (QALY). This approach ignores several factors that may determine the optimal CET. We seek to develop a new theoretical framework for the identification of CETs used in HTA. To that end, the objective of this study is to identify and assess factors that a new framework could include and consider the potential impact of accounting for these factors and the feasibility of doing so. Methods: We conducted a literature review using PubMed and Google Scholar, using a snowballing strategy, for studies published before August 2021. Studies fulfilling specific selection criteria formed the basis of a long-list of static and dynamic factors classified as demand-side, supply-side, or market factors. We applied a score-based factor assessment using five criteria: i) research quality, ii) research quantity, iii) feasibility, iv) relevance, and v) independence. We short-listed the factors for further assessment and inclusion in the framework through consultation with an independent expert advisory group. Results: We identified 57 factors, rationalised to 40 for factor assessment: 22 demand-side, five supply-side, and 13 market factors. The short-list included at least one factor from each category, including the size of the NHS budget, scientific spillovers, bargaining power distribution, on-patent competition, and regulatory environment. The advisory group provided insights on the applicability and significance of short-listed factors in terms of their expected impact on choosing the optimal CET. Conclusion: Our research demonstrates extensive basis and reason for considering multiple factors when identifying a CET for use in HTA decision-making. We provide evidence on the importance of considering several types of factors currently neglected by HTA agencies when determining thresholds and contributes to the discussion on the need to develop a new framework for setting optimal CETs for decision making and resource allocation in health care. A new framework should consider demand-side, supply-side, and market factors, which are likely to differ between jurisdictions and through time.

21. **Marissa Collins** (Glasgow Caledonian University), Rachel Baker, Micaela Mazzei, and Cam Donaldson, Yunus Centre for Social Business and Health, Glasgow Caledonian University, UK. Alec Morton, Department of Management Science, University of Strathclyde, UK. Lucy Frith, Centre for Social Ethics and Policy, School of Law, University of Manchester, UK. Keith Syrett,

University of Bristol Law School, University of Bristol, UK. Paul Leak, Directorate of Health and Social Care, Scottish Government, UK

Developing and implementing a framework for priority setting in health and social care

Background: There is a move, internationally, towards greater integration of health and social care. In principle, integration reduces budgetary boundaries which can facilitate sharing of resources across health and social care. Part of the agenda is for local delivery organisations to alter the balance of care from acute settings to community environments. To facilitate this shift, against a background of increasing austerity, there is a need for robust processes for making difficult resource allocation decisions which meet the standards of disciplines such as economics, ethics, law and decision science. In 2014, the Scottish Government established 31 Health and Social Care Partnerships (HSCPs) acting as single commissioners with shared budgets to deliver this agenda. Aim: To develop and implement an enhanced, multi-disciplinary framework for priority setting, for use by four HSCPs, and assess its impact on processes, decision-making and resource allocation. Methods: To develop the framework, a literature review was conducted and the combined framework was presented to a multi-disciplinary workshop involving academics, local and national-level stakeholders. During implementation of the framework, Participatory Action Research was undertaken to explore how the framework functioned within HSCPs, to document how participants engaged with the framework and to consider how the framework could be adapted to anew, and complex, institutional setting. Interviews were conducted before and after working with the framework. An online survey of priority setting performance was conducted with all HSCPs to collect data on processes in each area to compare across and within HSCPs. Results: The framework is underpinned by principles from economics (opportunity cost), decision-analysis (good decisions), ethics (justice) and law (fair procedures). It includes key stages for those undertaking priority setting to follow, including: framing the question, looking at current use of resources, defining options and criteria, evaluating options and criteria and reviewing each stage. Each of these has further sub-stages and includes a focus on how the framework interacts with the consultation and involvement of patients, public and the wider staff. Three out of the four sites worked through the process and made recommendations. Survey data has been collected and data analysis is on-going, results will be reported.

22. **Dimitris Pipinis** (NHS England & Improvement), Svetlana Batrakova (NHS England & Improvement). Ranya Alakraa (NHS England & Improvement). Edmund Haacke (NHS England & Improvement). Rebecca Hand (NHS England & Improvement). Evelyn Koon (NHS England & Improvement). Steven Paling (NHS England & Improvement)

Drivers of crowding in type 1 emergency departments in England: An analysis using the Emergency Care Data Set

Crowding of patients in the emergency department (ED), resulting from a mismatch between needs and resources, has been associated, in previous research, with both worse patient experience and increased mortality as well as with higher staff turnover. In the UK, waiting times in emergency departments have been worsening in the last few years, a situation which could have been exacerbated by the impact of the COVID-19 pandemic as patients who avoided/missed treatment due to the pandemic end up presenting in an

emergency setting. Despite the salience of crowding for patients and staff there is limited previous work investigating the drivers of crowding in ED. In this article, we develop novel metrics of crowding in ED in England using data from the Emergency Care Data Set (ECDS) which has record level information on A&E attendances including the type of complaint the patient presented with as well as an assessment of acuity. Using the ECDS data, aggregated at the site level, we are able to examine how a large set of factors can affect crowding in the emergency department for different types of patients based on their acuity when presenting in ED. Estimating several panel data models, our analysis identifies bed occupancy (primarily of General and Acute beds) as a key driver of crowding in the ED. Interestingly, the effect of bed occupancy is particularly pronounced for patients classed as major, rather than minor or resus. For minor patients this likely reflects the fact that they typically do no need to be admitted while for resus patients the fact that their critical condition means that they are prioritised irrespective of bed occupancy. Our analysis also finds that increases in the share of patients needing to go through a medical assessment unit pathway increase crowding, albeit in a modest way. We finally find that increases in the share of frail patients (proxied by those +75 year old) are associated with increased crowding, mainly for major patients. To the best of our knowledge this work provides for the first time statistical evidence on how several possible factors may be contributing to crowding in ED.

23. **Melisa Sayli** (University of Surrey), Giuseppe Moscelli, University of Surrey. Jo Blanden, University of Surrey. Chris Bojke, University of Leeds. Marco Mello, University of Surrey

Do organisation-level interventions improve staff retention? Evidence from English NHS hospitals

In many hospital care systems, nurses are a key input factor for the delivery of patient care. Despite representing the largest share of the clinical workforce in the English NHS, nursing staff have been under significant pressure with high vacancy numbers and increasing leavers' rates. This has a direct impact on the organisation of work, and, indirectly, on patient outcomes. These nursing shortages have been highlighted in official policy documents, and to address these concerns at local level, in July 2017 NHS Improvement (NHSI) has launched the Retention Direct Support Programme (RDSP). This Programme aimed to reduce the turnover rates of nursing staff in Acute Trusts and clinical staff in Mental Health Trusts, and was rolled out in 5 cohorts at different times. Trusts were allocated into cohorts based on their past turnover rates and trends. The programme required Trusts to develop bespoke strategies, and their progress was monitored by NHSI, which provided targeted support where needed. We use Electronic Staff Records data from 2015 to 2019, and exploit the differential timings of the programme start dates to evaluate the RDSP's effectiveness on nursing retention by implementing recent methodological advances in the difference-in-difference literature with staggered treatment adoption, i.e. Callaway and Sant'Anna (2020) and Sun and Abraham (2020) estimators. Overall, we find that the programme has improved nursing retention by 0.78 percentage points (pp), i.e. it helped retaining on average 1,686 nurses and midwives who would have left their Trust otherwise. Having the lowest average retention in the past 5 years, Trusts in Cohort 1 benefited from the programme the most with an average 0.95 pp increase in nursing retention. Despite spending the shortest time in the RDSP, Trusts in Cohort 4 improved their retention on average by 0.91pp. We do not find any significant impact of the programme in Cohort 3. Our findings suggest that non-monetary local interventions can improve hospital

workforce retention in English NHS. The RDSP's impact might be limited in alleviating the nursing workforce challenge, but similar interventions can provide viable and sustainable ways to prevent the 'heating' of workforce pressures in publicly funded healthcare systems.

24. **Jingya Zeng** (University of Exeter)

Heterogeneous Effects of Internet Use on Mental Well-being During the COVID-19 Pandemic in the UK

Background: Several studies suggest negative psychological impacts of the COVID-19 pandemic. With the lockdown measures, our daily lives change and almost all communication shifted online. However, the evidence of the effects of online life on mental well-being is mixed. Objective: This study aims to examine the heterogeneous effect of internet usage on mental health for different age and gender groups, and areas with different COVID-19 infections during the COVID-19 pandemic in the UK. Methods: We use data from the Understanding Society, main and COVID-19 survey. And we use the linear regression model and logit model to analyze, controlling socioeconomic factors, previous mental health, personality, etc. Internet usage is measured by either (i) the internet use frequency or (ii) a vector of internet use purpose (functional, leisure and learning, social). Mental health is measured by either (i) the Likert GHQ-12 score (0-36 scale), or (ii) the Caseness GHQ-12 score (binary), or (iii) psychological distress and social dysfunction dimension of the GHQ-12 score. Results: We find that the effects of internet use on mental health vary in different mental health measures by age groups and gender. Within young groups, we find opposite effects between females and males. The mental health of females, particularly social dysfunction, benefits from a moderate or high internet use frequency (compared to a low level) or using the internet for leisure and learning purposes more often. Whereas, the same internet use frequency or purposes detriment the mental health of males, especially the psychological distress. Within older groups, using the internet for a moderate level is associated with better mental health (particularly decreasing social dysfunction) of males, while no significant relationships are found for females. In addition, we find some evidence that significant effects found among males only exist in high COVID-19 cases rate areas, while the benefiting effects among young females exist both in high and low COVID-19 cases rate ar! eas. Conclusions: Internet usage has heterogeneous effects on public mental health. The policymakers should develop strategies that vary in age and gender groups and vary for areas with different levels of public crises (e.g. the current COVID-19 pandemic).

25. **Chandanee Wasana Kalansooriya** (City, University of London), Prof. Mireia Jofre-Bonet, Department of Economics, City University of London. Dr. Victoria Serra-Sastre , Department of Economics, City University of London

Nutritional transition and demand for a healthy diet: An analysis using Almost Ideal Demand System

Nutritional transition - the changes of food consumption behaviour and lifestyle towards an unhealthier pattern– accompanied by economic growth, is identified as a major cause of growing diet-related Noncommunicable diseases (NCDs) in low and middle-income countries (LMICs). Likewise, Sri Lanka-an LMIC- is experiencing higher prevalence rates of diet-related

NCDs and has been identified as a country in the fourth stage of the nutritional transition. In this study, I aim to identify how households have changed their food consumption behaviour during a decade that the country recorded a higher per-capita income growth. I focus on two factors that modify individuals' health-related behaviour: education and the existence of diet-related disease, to explore how those two factors have influenced household food choices. I used data from two waves of Household Income and Expenditure Survey (HIES) in Sri Lanka in 2006 and 2016. I defined fourteen food groups, classified as healthy and unhealthy, based on the guidelines of diet-related disease control. I calculated income and price elasticities of each food category for both years, by education level and by households those with diet-related disease, using a linear approximation Almost Ideal Demand System (LA/AIDS) with a two-stage estimation method to handle the zero consumption problem of some food categories. The preliminary results reveal positive income elasticities for both healthy and unhealthy foods, with the coefficients being higher in 2016 than in 2006. That indicates the responsiveness of demand to income for both healthy and unhealthy food has increased over time. I also found larger price elasticities for some healthy and unhealthy foods showing that price policy could be an efficient tool for encouraging healthy consumption and discouraging harmful consumption. Further, at higher education levels, I found that the demand for healthy and unhealthy foods has increased with the income increase, suggesting that education contributes to making correct decisions towards healthy consumption but not discouraging harmful consumption. I further found that having a diet-related disease induces only slight changes in food consumption towards a healthier diet, which is worth further exploring.

26. **James Love-Koh** (Centre for Health Economics, University of York; National Institute for Health and Care Excellence), Paul Schneider, School of Health and Related Research, University of Sheffield, Sheffield, UK. Simon McNamara, School of Health and Related Research, University of Sheffield, Sheffield, UK; BresMed, Sheffield, UK. Tim Doran, Department of Health Sciences, University of York, York, UK. Nils Gutacker Centre for Health Economics, University of York, York, UK

Decomposing the socioeconomic gradient of quality-adjusted life expectancy in England

Background Quality-adjusted life expectancy (QALE) combines mortality risk and health-related quality of life (HRQoL) information to measure healthy life expectancy using the quality-adjusted life year (QALY). QALE has previously been used as a population health indicator to highlight socioeconomic inequalities health in England, but little is known about the importance of individual HRQoL dimensions in explaining these inequalities. Methods We combined EQ-5D-5L data from the Health Survey for England for 2017 and 2018 (N=14,412) with full population mortality data from the ONS to calculate QALE by age, sex and deprivation quintile. The effect of HRQoL dimensions on the socioeconomic gradient in QALE was decomposed using an iterative imputation approach, in which socioeconomic inequalities in each domain were removed by imputing the response distribution of the richest quintile for all participants. Sampling uncertainty in the HRQoL data was evaluated using bootstrapping. Results People in the least deprived fifth of neighbourhoods in England can expect to live 7.0 years longer and experience 11.1 more QALYs than those in the most deprived fifth. Females have higher life expectancy and QALE than males, with differences of 3.58 years and 0.19 QALYs, respectively. The contribution of EQ-5D domains to inequalities in QALE varies by sex. Pain/discomfort (20.6%) and anxiety/depression (10.6%) account for a

greater proportion of the total QALE shortfall for females than males (8.6% and 1.3%, respectively). Conversely, for males, inequalities in mobility (9.9%) are more pivotal than for females (5%). Discussion Our results identify the extent of socioeconomic inequalities in lifetime health and the relative importance of inequalities by mortality and HRQoL. For the latter we found lifetime inequalities between the most and least deprived of 4.1 QALYs. We also demonstrate which dimensions of HRQoL are most important in explaining social inequalities in QALE, and how their contribution varies substantially with sex. Our findings can help to highlight what types of interventions can best alleviate health inequalities and that different approaches may be required for males and females.

27. **Sam Khavandi** (University of Manchester), Matt Sutton, University of Manchester. Luke Munford, University of Manchester

    Health and Mental Health Poverty in UK

    Background: The distinction between inequality and poverty is well-established with respect to income and wealth but is less so in the case of health. The idea that there is a minimum acceptable threshold below which an individual is experiencing 'health poverty' is conceptually appealing but rarely used in practice. Aim: We define poverty with respect to health and examine inequalities geographically, temporally, and between population groups in the UK to identify groups and areas of high need and hence target provisions to minimise health poverty. Data & Methods: We utilise Understanding Society, nationally representative data containing detailed longitudinal information on individual characteristics as well as health measures including the Short-Form12 (SF12) questionnaire and the General Health Questionnaire (GHQ). We define health poverty as dying within one year or reporting the lowest levels of health in any of the six health domains of the SF6D, obtained from the SF12. We define mental health poverty as GHQ/SF12MCS scores below 60% of the median. We produce 'heat maps' to examine for the presence of clusters, before examining the possible causes and consequences of mental health poverty. We show how rates of health poverty have changed over time for the population as a whole and for sub-groups of the population defined by gender, age, employment, ethnicity and geography. Results: There is an unequal distribution of both overall health and mental health poverty in the UK, with clusters in the North East, North West and areas with high levels of deprivation. We see an increase in health and mental health poverty in recent years. The level of health poverty is greater in the female population compared to the male population. Looking at employment, those unemployed and with long term sickness or disability are more likely to be in health poverty. Our results show that health poverty varies across age groups. Conclusions: We demonstrate the health inequalities present in the UK both across the population and within sub-groups using both overall health and mental health poverty. We advocate the use of these measures of health poverty in future work.

28. **Eduardo Costa** (Lancaster University), Céu Mateus, Lancaster University. Bernie Carter, Faculty of Health, Social Care and Medicine, Edge Hill University, Ormskirk, UK. Gerri Sefton, Intensive Care Unit, Alder Hey Children's NHS Foundation Trust, Liverpool, UK. Enitan D Carrol, Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, United Kingdom and Dept of Infectious Diseases, Alder Hey Children's NHS Foundation Trust, Liverpool. Sarah Siner, Clinical Research Division, Alder Hey Children's NHS Foundation Trust, Liverpool, UK. Dawn Jones, Clinical Research Division , Alder Hey Children's NHS Foundation

Trust, Liverpool, UK. Leah Evans, Clinical Research Division , Alder Hey Children's NHS Foundation Trust, Liverpool, UK. Caroline Lambert, Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, United Kingdom and Dept of Infectious Diseases, Alder Hey Children's NHS Foundation Trust, Liverpool. Jason Dean, Michael Barnes, Finance Department, Alder Hey Children's NHS Foundation Trust, Liverpool, UK. Bruce Hollingsworth, Lancaster University

The economic burden among carers of children with critical deterioration events in a tertiary children's hospital in the United Kingdom

Background: Emergency critical care admissions following in-hospital deterioration in children are expected to impose a significant burden for carers among different dimensions. One dimension relates to the financial and economic impact from both direct non-medical costs, associated with the admission, as well as indirect costs, reflecting productivity losses. A robust assessment of these costs is key to understand the impact of interventions aiming at reducing in-patient deterioration. This work aims to determine the economic burden imposed on families caring for hospitalised children that experience critical deterioration events. Methods: Descriptive study with quantitative approach. Carers answered a survey between July 2020 and April 2021. The sample comprised 71 families of children admitted to a critical care unit following in-patient deterioration, at a tertiary children's hospital in the UK. The survey provides a characterization of the carer's household and estimates of direct non-medical costs grouped in five different expenditure categories. Productivity losses can also be estimated based on the reported information. Results: Two-thirds of working carers had missed at least one workday in the week prior to the survey completion. Moreover, eight in ten carers reported having had to travel from home to the hospital at least once a week. Most carers (87%) reported expenditures associated to the child's admission in the week preceding the survey completion. These expenditures amount to £155 per week grouped in five categories (44% to travelling costs and 33% to food and drink costs with accommodation, parking, and childcare represented 17%, 5% and 3%, respectively). Additionally, weekly productivity losses for working carers are estimated at £258. Discussion and Conclusion: Emergency critical care admissions for children impose a substantial financial burden for carers. Moreover, productivity losses imply a subsequent loss to society. Even though subsidised hospital parking and on-site accommodation at the hospital contribute to minimising such expenditure, the overall impact for carers remains high. Interventions aiming at reducing emergency critical care admissions, or their length, can be crucial to further contribute to the reduction of this burden.

29. **Daniel Howdon** (University of Leeds)

Nonmarginal budgetary impacts and economic evaluation: is mortgaging a solution?

Recent years have seen an increase in the number of health technologies whose budgetary impact, if accepted by the relevant decision-making authority, would be deemed to be "nonmarginal". This means that decision-making regarding the acceptance or otherwise of such technologies would require adjustments to the relevant threshold employed in order to consistently fulfil the objectives – such as that of population health maximisation – set down in the remit of such decision-making authorities, since adoption of the new health technology would displace existing technologies not just at the margin of the healthcare

service's spending, but also health technologies that are more cost-effective than those displaced at the margin. One solution proposed for this has been that of a mortgage-type arrangement which would seek to smooth such nonmarginal budget impacts over future time periods. It has been argued that this would potentially permit a payment option that would over time be preferable for both a decision-maker seeking to maximise health over the relevant time horizon and for the manufacturer of the health technology. This paper seeks to examine the process by which such a potential mortgage-type arrangement would operate and how this interacts with the technical context in which decisions are made, how it interacts with the normative basis for decision-making, and considers the potential long-term implications for health service spending if such a policy was adopted.

30. **Luis Fernandes** (Centre for Health Economics, University of York), Panos Kasteridis, Centre for Health Economics, University of York. Rowena Jacobs, Centre for Health Economics, University of York. María José Aragón, Centre for Health Economics, University of York. Nils Gutacker, Centre for Health Economics, University of York. Najma Siddiqi, Department of Health Sciences, University of York

Assessing the quality and uptake of incentivised physical health checks for people with serious mental illness

Reviewing physical health is an integral part of the strategy to reduce the stark levels of premature mortality for people with serious mental illness (SMI). To promote physical health monitoring, the NHS provides financial rewards to GPs to conduct an annual review of the patient's physical health (through the Quality and Outcomes Framework (QOF) program). The review includes seven physical health checks (PHCs): cervical screening, alcohol consumption, smoking status, blood pressure, cholesterol, body mass index, and blood glucose. However, BMI, cholesterol and blood glucose were removed from the QOF in 2014/15 and alcohol was removed in 2019/20. Despite the incentives provided, not every patient receives annual PHCs. Our objective is to shed light on the uptake of PHCs

31. **Helen Dakin** (Health Economics Research Centre, University of Oxford), Ni Gao, Health Economics Research Centre, University of Oxford. José Leal, Health Economics Research Centre, University of Oxford. Rury Holman, Diabetes Trials Unit, University of Oxford. Philip Clarke, Health Economics Research Centre, University of Oxford

Using QALYs as a measure of global prediction accuracy in diabetes models

Background: Cost-effectiveness of diabetes treatments is commonly assessed using individual-patient simulation models. Diabetes models are currently validated by examining their ability to predict the incidence of individual (e.g. myocardial infarction, stroke, amputation) or composite events (e.g. first major cardiovascular event). However, different events or measures of model performance could select different "best" models. We propose using the mean squared error for QALYs as a global measure of prediction accuracy. This can be used to compare models and establish which is most informative for economic evaluation and health technology assessment. Methods: EXSCEL provides patient-level data for 14,752 patients followed up to 6.7 years. We extrapolated baseline data using the UK Prospective Diabetes Study Outcomes Model (UKPDS-OM) versions 1 and 2. Missing data were imputed using multiple imputation and published risk factor time paths. Default UKPDS-OM2 utilities

were used to estimate QALYs based on the clinical events predicted by both UKPDS-OM1 and OM2 and the actual events that occurred during the trial. In each case, QALY calculations made the same assumptions used in the model (e.g. that events have additive effects and deaths occur halfway through the year). For both model predictions and observed trial events, QALYs were estimated up until the point when the patient dropped out of the trial or was administratively censored. No discounting was applied. Results: Our paper will use mean squared error for QALYs to compare UKPDS-OM1 with OM2. Results will be compared against alternative measures, including weighted Brier scores for the incidence of any event, first major cardiovascular event and the incidence of individual events. Discussion: The strengths and weaknesses of QALYs as a measure of prediction accuracy will be discussed. This measure directly relates to decision-making and combines mortality and diverse clinical events into a single measure using evidence-based weights that reflect the preferences of the general population. By contrast, clinical composite events give equal weight to all events they include and no weight to other events. We will discuss how the methods could be adapted to assess the validity and calibration of models in other disease areas.

32. **Neil McHugh** (Yunus Centre for Social Business and Health, Glasgow Caledonian University), Rachel Baker, Yunus Centre for Social Business and Health, Glasgow Caledonian University. Cam Donaldson, Yunus Centre for Social Business and Health, Glasgow Caledonian University. Verity Watson, University of Aberdeen

Basic income and health: methodological considerations for eliciting public values

Background: COVID-19 has exacerbated the income and health divide in the UK. In this context, basic income has come to prominence as a means of redistributing resources to reduce income and health inequalities. Implementing basic income presents two major challenges: the cost of provision; and whether the public would support the necessary redistribution of resources and increased taxation required of some members of society. Research that elicits public values can generate new evidence about what, if anything, the general public are willing to sacrifice to reduce income and health inequalities and the relative value of income-based policies to achieve these twin goals. Research methods using stated preference techniques can potentially address this question. However methodological challenges exist. The aim of this methodological paper is to examine how to elicit public values for models of basic income and alternative income-based policies. Methods: We delineate different forms of public values, highlighting the research gap that exists from an economic perspective. The methodological challenges of eliciting public values for models of basic income are then considered, focusing on three key issues: valuing outcomes vs. processes; how value is expressed; and the perspective from which to elicit public values. Findings: This work is ongoing. While challenges remain, initial insights suggest potential to design methods to elicit public values using choice-based stated preference techniques, such as Contingent Valuation and Discrete Choice Experiments, with value expressed in money terms and respondents adopting a citizen perspective. Interpretation: No research has examined i) willingness to pay for different models of basic income or ii) the value placed on the redistributive impact - in terms of income and health inequalities - of basic income, and competing, redistributive policy options. This paper outlines a new area of research which can respond to this evidence gap and has the potential to positively impact policy processes for ways to tackle persistent and growing income and health inequalities.

33. **Kim Rose Olsen** (DaCHE, University of Southern Denmark), Christian Skovsgaard, DaCHE, University of Southern Denmark. Troels Kristensen, DaCHE, University of Southern Denmark. Ryan Pulleyblank, DaCHE, University of Southern Denmark

    Increasing Capitation in Mixed Remuneration Schemes: Effects on Service Provision and Quality of Care

    Many health systems apply mixed remuneration schemes for private practicing physicians. The share of income generated from fee for service (FFS) and capitation may differ between various systems. However, little is known about the effects of changing the relative FFS/capitation share in mixed remuneration schemes. We assess the effect of a reform replacing FFS on contact services with a fixed capitation for diabetes patients reversing the FFS/capitation rate from 70/30 to 30/70. We apply three-way-fixed-effect models (patient, GP and time fixed effects) to estimate the effects of the changed remuneration scheme on service provision and quality related services delivered to diabetes patients. The change was "mechanically" implemented at the patient level by use of the GPs IT system: when a diabetes patient was registered for an annual control visit, she was enrolled in the new scheme. This involves a stepwise and "as good as random" enrolment at patient level and we exploit this stepwise enrolment of patients to measure differences in service provision before and after enrolment. As an annual control visit normally leads to an increase in service provision there is a risk of overestimating the effect of enrolment on the use of services. To adjust for this, we use the difference in service provision before and after an annual control visit in the pre-intervention period as counterfactual. Patient- and GP fixed effects were applied to control for any residual time invariant selection and time trends were included to control for trends in the outcome variables. Our results show that the provision of contact services is unchanged, but the number of quality related services decline. The latter effect is higher for patients with comorbidity. No heterogeneity effects are found on practice type (group vs solo, GP income level, level of diabetes knowledge).

34. **Daniela Rodrigues** (NIHR Imperial Patient Safety Translational Research Centre, Institute of Global Health Innovation, Department of Surgery & Cancer, Imperial College London), Noemi Kreif (Centre for Health Economics, University of York), Ara Darzi (NIHR Imperial Patient Safety Translational Research Centre, Institute of Global Health Innovation, Department of Surgery & Cancer, Imperial College London), Mauricio Barahona (Centre for Mathematics of Precision Healthcare, Department of Mathematics, Imperial College London), Erik Mayer (NIHR Imperial Patient Safety Translational Research Centre, Institute of Global Health Innovation, Department of Surgery & Cancer, Imperial College London)

    Key factors predicting a technology adoption in English primary care services: a variable importance analysis

    Background: The COVID-19 outbreak led to major technological and operational changes in English general practice to maximise safety. Most practices installed all necessary tools, including advanced telephony, video, and the so-called online consultation tools (i.e., patient contact forms) to provide care remotely, and implemented the 'total triage' model in which every patient is triaged before booking an appointment. After a year of experimentation, the NHS recovery plan for 2021/22 called for a significant increase in the use of online

consultation tools to support total triage. However, despite most practices having installed online consultation tools, there is a large variation in terms of their adoption, which can raise efficiency and equity concerns. Objective: To identify the patient, staff and practice's characteristics that are most important in predicting online consultation adoption. Methods: We constructed a rich dataset of 303 general practices in North West London for the period between January 2018 and June 2021. We linked data at practice level from the Whole Systems Integrated Care (WSIC), online consultation system providers, NHS Digital, GP Patient Survey, Ministry of Housing, Communities & Local Government, Care Quality Commission and Ofcom. We use the targeted minimum loss-based estimation, which relies on an ensembling super (machine) learning approach, to determine the importance of each candidate variable in predicting the outcome. We choose algorithm-agnostic variable importance measures such as the marginalised mean difference across reference levels and contribution to R-squared by each candidate variable. Results: Before March 2020, only 46 out of the 303 practices had online consultation tools. Since go-live, the average number of online forms submitted by the patient/carer per month per 1000 registered patients ranges from 0.5-247 across practices. We will present factors that were estimated to be predictive of online consultation adoption. These include, but are not limited to, patients' comorbidities, staff's demographics, and practice's connectivity. Conclusion: This study can offer practical guidance to innovators, practice managers, commissioners, and policy makers on the ongoing adoption of online consultation in general practice by highlighting key areas that could be the focus of new interventions, if the goal is to achieve large-scale, sustained adoption.

35. **Edward Webb,** Paul Kind, David Meads, Adam Martin (AUHE, University of Leeds)

COVID-19 and EQ-5D-5L health state valuation

Background: We investigate whether and how the COVID-19 pandemic has influenced UK general population health state values. Changes would have important implications, as general population values are used in health resource allocation. Data: An online UK general population survey was conducted in Q2 2020 in two waves, four weeks apart. Participants rated two EQ-5D-5L states, 11111 and 55555, as well as dead, using a visual analogue scale (VAS) from 100=best imaginable health to 0=worst imaginable health. Participants indicated how worried they were about catching COVID-19 and subjective risk of infection on five-point Likert scales. In wave 2, participants stated whether COVID-19 affected their health and/or quality of life. Analysis: VAS ratings for 55555 were transformed to the full health=1, dead=0 scale. Participants were excluded if they gave illogical VAS responses, or responses such that a unit change on the 100-0 scale implied a change of >.1 on the 1-0 scale. VAS responses were analysed using Tobit models including worry about COVID-19 and subjective risk of infection as independent variables. Regressions with wave 2 data also included effects of COVID-19 on health and quality of life. Results: There were 1,502 respondents in wave 1 and 1,519 in wave 2, with 1,245 and 1,294 respectively included for analysis. A unit increase in subjective infection risk was associated with rating dead 5.46 higher (p=.003) and 55555 2.15 higher (p=.034). Participants reporting negative effects of COVID-19 on health rated dead 6.93 higher (p=0.019) and 55555 6.26 higher (p<.001). Participants reporting positive effects rated dead 14.1 higher (p=.005) and 55555 5.85 higher (p=.054). No significant effects were found for worry about infection or COVID-19 affecting quality of life. COVID-19-related variables had no significant effects on 11111 ratings or rescaled valuations of 55555.

Conclusion: There is evidence that the pandemic influenced valuations of poor health and dead, as two COVID-19-related variables significantly influenced ratings. However, ratings changed similarly whether COVID-19 affected health positively or negatively. One interpretation is that COVID-19 impacting health, either positively or negatively, led participants to re-assess their views on health. Further research is planned, for example exploiting geographical differences in COVID-19 prevalence.

36. **Peter Sivey** (Centre for Health Economics, University of York), Katja Grasic, Centre for Health Economics, University of York. Anastasia Arabadzhyan, Centre for Health Economics, University of York

Healthcare Utilisation and Excess Mortality During the COVID-19 Pandemic

During the first wave of the COVID-19 pandemic, there were substantial excess deaths in England compared to the 5-year average. While many of these deaths occurred in hospital and care home settings, more people than average died in their own homes (at home). In this paper we aim to explore whether healthcare utilisation trajectories of patients in the final months of life during the COVID-19 pandemic could explain any of the excess deaths at home. We use Hospital Episode Statistics (HES) linked to ONS death data which identifies the cause and location of death. The HES data allows us to observe all inpatient and outpatient care provided to patients in the months leading up to their death. We use graphical and regression analysis to compare end-of-life healthcare utilisation as measured by length of stay and outpatient appointments in 2020/21 compared to previous years for patients dying of cancer and cardiovascular disease (CVD), and mental/behavioural disorders. Our analysis shows that during the periods of peak COVID-19 caseload (March-May 2020 and December 2020 to March 2021) patients dying of cancer and CVD had substantially less hospital treatment in their final month of life compared to historical controls. A similar pattern is observed for patients dying at home and in hospital. During the periods where COVID-19 caseloads were relatively low (e.g. in the summer of 2020), end of life hospital treatment returned to 'normal' levels for these disease areas. Looking at patients whose end-of-life care straddles the start of the pandemic, we see a similar pattern: hospital treatment was reduced compared to historical controls only in the periods of peak COVID-19 caseload. We find opposite patterns for outpatient appointments for patients in the final month of life, with a marked increase in 2020/21 compared to historical controls, which persists through the year and is not confined only to the periods of peak COVID-19 caseload. Overall our results suggest a marked reduction in healthcare utilisation leading up to death for cancer and CVD patients during periods when normal healthcare provision was disrupted by high COVID-19 caseload.

37. **Charlie Moss** (University of Manchester), Laura Anselmi, The University of Manchester, Matt Sutton, The University of Manchester

Emergency department use by people experiencing homelessness in England

Emergency departments (EDs) are an important point of access to health care for people experiencing homelessness (PEH). However, there is limited evidence relating to ED attendances for PEH in England. We used Hospital Episode Statistics to investigate the

factors associated with features/outcomes of the ED attendances of 131,643 PEH who attended an ED in England over 2013-2018. We found that, compared with males, female PEH had fewer treatments and investigations, were less likely to be admitted, and were more likely to be discharged for GP follow up or without any follow up. Patients who resided in more deprived areas prior to being recorded as homeless had a greater probability of leaving the ED before treatment compared with less deprived equivalents. Patients who received a primary diagnosis of psychiatric problems at the attendance received fewer treatments and investigations and were more likely to be referred to other services compared with patients who received other diagnoses. This may suggest that some PEH use the ED as a point of contact for mental health care that could be addressed more appropriately via other means. We found significant differences across all outcomes by ethnic group, which require further study.

38. **David Lugo-Palacios** (London School of Hygiene & Tropical Medicine (LSHTM)), Patrick Bidulka (LSHTM). Richard Grieve (LSHTM). Stephen O'Neill (LSHTM)

Emulating randomised controlled trials from electronic health records by applying an instrumental variable approach: an application to type 2 diabetes mellitus (T2DM)

Background: Reimbursement agencies use estimates of comparative effectiveness from electronic health records (EHRs) to complement those from randomised controlled trials (RCTs). These nonrandomised studies (NRS) can consider populations, treatments and endpoints excluded from RCTs. However, a major concern is that treatment effectiveness estimates from EHRs are subject to unmeasured confounding. Target trial emulation, in which the design principles of an RCT are applied to a NRS, can help calibrate methods that purport to address unobserved confounding. Objective: To calibrate a local instrumental variable (LIV) design against head-to-head RCTs within a NRS comparing the effectiveness of alternative second-line treatments for type 2 diabetes mellitus (T2DM). Methods: A systematic literature review was conducted to identify RCTs contrasting alternative second-line treatments for patients with T2DM. We emulated RCTs by applying the RCTs' inclusion criteria and treatment definitions for patient cohorts and treatments identified within the Clinical Practice Research Datalink (CPRD) from 2014 to 2020. We then assessed comparative effectiveness for these cohorts by applying a LIV to minimise bias from unobserved confounding. The instrument – the historical prescribing preference of the clinical commissioning group (CCG) ¬– was chosen to encourage choice of one of the antidiabetic drugs of interest without directly influencing the outcome (e.g. HbA1c). This LIV approach yielded personalised treatment effects, which were aggregated to obtain average treatment effect (ATEs), the same estimands as provided by the RCTs. Results: We found that the CCG's historical prescribing preference is a strong predictor of the choice of second-line treatment (F-statistic > 490), and balances key prognostic variables including age and baseline HbA1c. We will now compare the ATEs from the LIV analyses that emulate the RCTs with the corresponding ATEs reported by the published RCTs. Conclusion: Emulating RCTs with EHRs can help calibrate estimates from NRS for those patients, treatments and endpoints available within RCTs. We will discuss how this approach extends to patients, treatments and endpoints excluded from the RCT and that are only available within EHR data. We will also discuss, more generally, how this approach to EHR data for assessing treatment effectiveness and cost-effectiveness could be useful to agencies such

39. **Tom Robinson** (Newcastle University), Sarah Hill, PHMR. Yemi Oluboyede, PHMR & Newcastle University

The Impact of Excluding Respondents Who Fail A Dominance Test in A Discrete Choice Experiment on the Empirical Estimates: Evidence From An Unusual Case Study

Discrete choice experiments (DCEs) are a widespread tool used in health care decision making. One common method of examining the perceived 'quality' of the data in a DCE is the inclusion of a dominance test, where a logically dominated choice set is presented to the respondent at some point during the survey. Those respondents who select the dominated option are seen to have failed the dominance test. As argued by Lancsar & Louviere (2006), removing these 'irrational' responses from the final estimation sample can be seen as 'imposing' rather than 'investigating' preferences, and should be avoided. However, as noted in a comprehensive recent review (Tervonen et al 2018), a significant proportion of studies choose to exclude respondents who failed the dominance test from their final estimate sample. This paper will present data from a DCE conducted as part of a valuation study for the Weight-Specific Adolescent Instrument for Economic Evaluation (WAItE), a brief, 7-item health-related quality of life tool developed as the first weight-specific, measure for adolescents appropriate for economic evaluation. The online DCE was completed by a representative sample of 1,000 UK adults, and included a dominance check. Preliminary analysis indicated that an unusually high proportion of respondents (approximately 40%) failed the dominance test, a far larger proportion than reported in previous DCEs in this area. Using mixed and multinomial logit models, preliminary analysis found that including those participants who failed the dominance test in the estimation sample contributed to counter intuitive empirical estimates, with potentially serious implications for the interpretation of the results of the study. The results from the final analysis will be presented at the meeting.

40. **Tuba Saygin Avsar** (University College, London), Xiaozhe Yang (UCL). Prof Paula Lorgelly (UCL)

How is the societal perspective defined in health technology assessment? Practices from around the globe

How is the societal perspective defined in health technology assessment? Practices from around the globe Background: Many argue that the ultimate aim of economic evaluations is offering guidance on resource allocation based on the interest of the public from a societal perspective. However, the application of a societal perspective in health technology assessment (HTA) is not mandatory in most countries, and it is not clear how the societal perspective should be defined. This study aimed to systematically compare how the societal perspective has been defined in HTA guidelines in different countries. Methods: HTA methods guidelines were identified through the ISPOR, INAHTA and GEAR websites. The HTA guidelines were grouped into two categories: well-established and newly-developing agency guidelines, based on whether they published their first HTA guidelines 10 years ago. Data extracted summarised the methodological details in the reference cases, including any specifics on the societal perspective. Results: The database search yielded 27 HTA methods guidelines published in English. Currently, we have extracted data on 12 guidelines, six in

each category. The most recent HTA guidelines from the national HTA agencies of the following countries were utilised: Australia, Canada, England, Germany, Ireland, Netherlands, India, Indonesia, Japan, Malaysia, Norway and Singapore. The maturity of these agencies is reflected in their attitudes towards the societal perspective. Although all guidelines from the well-established agencies recommended a societal perspective, the types of costs and benefits that should be included, and the recommended approaches to valuing them were diverse. Amongst the newly-developing HTA agencies, only India and Indonesia's HTA principles explicitly illustrated that the societal perspective was preferred. Discussion: By definition, the societal perspective should cover all consequences to the society as a whole (including social care, criminal justice, education) and this should align with societal values. Frameworks for the economic evaluation of policies with costs and outcomes that fall on different sectors exist, but HTA agencies may be challenged operationalising them due to a lack of data, guidance and/or exemplar. We hope documenting current practice will inform HTA methods guidance, both for new agencies and revisions of established guidelines, as well as encourage discussion on what should be in the societal perspective when informing reimbursement decisions.

41. **Ian Ross** (London School of Hygiene & Tropical Medicine)

Water-adjusted person years – enabling better economic evaluation of water supply interventions to improve public health

Globally, 770 million people lack a basic water service, and 485,000 child deaths annually are attributable to diarrhoea caused by inadequate drinking water. However, household water insecurity harms quality of life beyond health. Negative impacts include water collection time and effort, worrying about risk of assault or water availability, or anger and shame at not being able to complete basic tasks such as washing and cooking. US$ 35 billion is invested in water supply in low- and middle-income countries every year. However, much of that sum is likely spent inefficiently because full economic evaluation is rarely used and, when it is, quality of life gains beyond health and time savings are excluded in the absence of means for their valuation. There has recently been innovation in the measurement of household water security. This better measurement enables valuation of an index for weighting an extra-welfarist measure of the value of water security. In this paper I propose the theoretical basis for a "water-adjusted person year", inspired by the quality-adjusted life year (QALY), and provide hypothetical examples of its use.

A Brief Water Insecurity Experiences Scale (BWISE) is being used by over 100 organisations worldwide. It has four items, with responses on a five-level frequency scale. However, equal attribute weighting means BWISE captures the state of water security rather than its value, precluding use of BWISE scores in economic evaluation. Using methods common in health state valuation, a water-related quality of life index can be derived from the BWISE descriptive system. The index is anchored at 0 denoting "completely water insecure" (rather than "death" as in QALYs) and at 1 denoting "completely water secure". One water-adjusted person year (WAPY) represents a year in complete water security. WAPYs could be used in cost-effectiveness analysis (e.g. cost per WAPY gained) or in cost-benefit analysis, summed with other outcomes after willingness to pay valuation. I demonstrate two hypothetical cost-effectiveness analyses using the WAPY, illustrating its potential for better informing decisions which are at present made on the basis of cost alone. Water supply budgets are

always constrained. Using WAPYs to inform investment decisions would help maximise welfare gains with those budgets. Over time, more people would use better-quality services as a result, with associated improvements in public health.

42. **Fiorella Parra Mujica** (Health Economics Research Centre (HERC), University of Oxford), Laurence SJ Roope (HERC, Univ. of Oxford). Mara Violato (HERC, Univ. of Oxford). Raymond Duch (Centre for Experimental Social Sciences-CESS, Univ. of Oxford). Philip M Clarke (HERC, Univ. of Oxford)

    Who shall live in the age of COVID?

    Background: A cornerstone of health technology assessment (HTA) is measuring outcomes in life-years or Quality Adjusted Life Years (QALYs). Implicit in the use of these metrics is a judgement that healthcare budgets should maximise (quality adjusted) life-years rather than lives. Aim: To investigate how the public in 13 countries value lives versus life-years, and whether the relative values they assign are conditional on other factors, including age and participation in labour markets. Methods: We conducted an experiment involving 15,536 adults in 13 geographically and economically diverse countries, representing roughly half the world's population. Quota sampling ensured that samples matched educational and demographic characteristics. Respondents were randomly allocated (1:1:1:1) to four versions of a series of three questions. The context was a life-saving COVID-19 vaccine without which people would die. First, respondents chose whether to save a healthy 55-year old (30 remaining years life-expectancy) or a healthy 75-year old (10 remaining years life-expectancy). Respondents who chose the 55-year old were asked two further questions, allowing them to express a preference for one 55-year old versus up to six 75 year olds. The four versions of this series varied whether the 55/75 year olds were working/not working. For each version, an equivalent variation approach was used to estimate the mean numbers of 75-year old lives respondents would trade for one 55-year old. Results: When the 55- and 75-year olds were both working or both not working, respondent preferences equated 1.85 (95%CI: 1.64–2.06) 75-year olds to one 55-year old. When the 55-year old was working but the 75-year olds were not, this rose to 4.79 (95%CI: 4.52–5.07). When the 75-year old was working but the 55-year olds were not, there was no significant difference in respondent preferences for 75- versus 55-year olds (0.94 (95%CI: 0.45–1.43)). Conclusions: The implications for HTA in regards to allocation of COVID-19 vaccines and beyond will be explored. We will discuss the degree to which public preferences support the notion that a QALY is a QALY or whether other factors could be at play, such as social discount rates.

43. **Edward Penington** (University of Oxford), Apostolos Tsiachristas, University of Oxford. Keith Hawton, University of Oxford. Belinda Lennox, University of Oxford

    The impact of public health responses to COVID-19 on patients with Severe Mental Illness in South-East England

    Background: Deterioration in the mental health of the general population during the first wave of the COVID-19 pandemic and associated public health measures has been well reported, but the impact on people with severe mental illness (SMI) has received less attention. Methods: We accessed records of 34,446 patients with SMI from Oxford Health

Foundation Trust. Data included contacts with outpatient mental health services, hospitalisation, and health outcomes from March 2016 to July 2020. We used interrupted time series analysis to estimate the immediate and consequent impact of the 1st lockdown in England on the weekly rate of 64 variables. Potential bias in the estimates influenced by patient composition or time censoring were minimised using propensity score weighting and parametric survival models respectively. Serial correlation was controlled for with the use of ARIMA models. Results: In contrast to other published literature, there was no reduction in inpatient admissions (-4.2 per week; 95% Confidence Interval: [-9.9, 1.5]) or bed days (-1.8 p.w.; [-54.0, 50.5]). Outpatient contacts did not change (-26 p.w.; [-475, 423]), due to an immediate increase in remote contacts (699 p.w.; [511, 867]). Referrals to outpatient services fell immediately (-196 p.w.; [-300, -91]), mainly referrals to Community Mental Health Teams (-55 p.w.; [-85, -25]) and Crisis Teams (-23 p.w.; [-45, -2]). After controlling for the composition of patients assessed, mean scores for Health of the Nation Outcome Scales (HoNOS) did not show an immediate change (-0.13; [-0.57, 0.31]), but deteriorated over the following weeks (0.075; [0.001, 0.032]). The HoNOS sub-scales show that the primary drivers of this were problems with agitated behaviour (0.014 p.w.; [0.006, 0.021]), physical illness (0.013 p.w.; [0.006, 0.021]), daily living (0.010 p.w.; [0.003, 0.017]) and drinking and drugs (0.007 p.w.; [0.001, 0.014]). Conclusions: Patients with SMI were negatively impacted by the COVID-19 pandemic and associated public health restrictions, with deterioration in wellbeing occurring gradually rather than as an instantaneous consequence of lockdown. Despite this, referrals to outpatient services fell and inpatient admissions did not increase, implying potential unmet need and restricted access.

44. **James Hall** (Health Economics Unit, Institute of Applied Health Research, University of Birmingham, Birmingham), Dr Suzanne Bartington and Prof. Neil Thomas, Institute of Applied Health Research, University of Birmingham, Birmingham, England. Prof Sue Jowett, Health Economics Unit, Institute of Applied Health Research, University of Birmingham, Birmingham, England

The WM-Air Health and Economic Assessment Tool: A decision-making tool for local partners to estimate the economic impacts of air pollution

Background: There is increasing interest from local authorities, public and commercial organisations in quantifying the health impacts of policies which either mitigate, or aggravate, poor air quality. Moreover, there is interest in a broad range of outcome metrics, such as preventable mortality, quality-adjusted-life-years (QALYs) and days off work. Traditional approaches have several shortcomings, most importantly not estimating QALY impacts, which when monetised using a £20,000/QALY threshold may potentially outweigh cost savings to the health system. Data and Methods: Following consultation with end-users we designed a customisable and easy to use downloadable Excel tool. The tool allows users to select specific West Midlands sub-populations and to apply bespoke time horizons, discount rates, type and scale of changes in pollutant concentrations, and proportion of population exposed to the change. In addition, we provide a range of relevant regional policy scenarios (e.g., vehicle fleet electrification) the air quality impacts of which are built into the model. The health economic modelling assumes a unique structure combining life-table and Markov modelling, and relative risk models. The Markov model has 7 health states; disease-free, child asthma, adult asthma, coronary heart disease, lung cancer, stroke and death. Within each health state is a life-table which draws upon area-specific ONS

population demographics. Age and gender-specific transition probabilities are taken from ONS birth-rates, all-cause mortality and literature-derived disease incidences. Ward-specific disease relative risks are assigned where obtainable from Public Health England (PHE) Public Health Profiles. These, and the level of air pollution abatement in each fully customizable air pollution scenario, contribute to relative risks associated with disease incidence and all-cause mortality. Results: The model provides an accessible dashboard for end users to view results from customised scenarios. The dashboard features information on NHS costs (e.g., primary, secondary, emergency care, prescriptions); QALYs gained; number of lives saved; disease cases prevented and disease cases attributable to air pollution. Preliminary results suggest that monetary value of QALY gains and mortality prevented by air pollution mitigation will be greater than NHS cost savings in this context.

45. **Paul Schneider** (University of Sheffield), John Brazier, University of Sheffield, UK; Nancy Devlin, University of Melbourne, Australia

    Not just another EQ-5D-5L value set for the UK: using the 'OPUF' approach to study health preferences on the societal-, group-, subgroup-, and individual person-level

    BACKGROUND: We recently reported on the development of a new method for valuing health states, called 'Online elicitation of Personal Utility Functions' (OPUF). It is based on compositional preference elicitation techniques. In contrast to established, decompositional techniques, such as time trade-off or discrete choice experiments, the OPUF approach does not require hundreds or thousands of respondents, but allows estimating utility functions for small groups and even on the individual level. The objective of this study was to generate and compare EQ5-5D-5L value sets on the societal-, group-, subgroup-, and individual person-level. METHODS: The OPUF Tool is a new type of online survey (a demo version is available at: https://eq5d5l.me). It broadly consists of three valuation steps: dimension weighting, level rating, and anchoring. Responses were combined on the individual level to construct personal utility functions, using an additive linear model. Every respondent also completed three conventional discrete choice experiments. Preferences were aggregated across individuals to estimate a societal and various group-level preference functions. We then assessed the heterogeneity of preferences between groups using descriptive statistics and k-means cluster analysis. RESULTS: A representative sample (N = 1,000) of the UK population was recruited through the prolific online platform. On average, it took participants about 7 minutes to complete the survey. Data of 874 respondents were included in the analysis. For each respondent, we constructed a personal EQ-5D-5L value set. The derived utility functions predicted respondents' choices in discrete choice experiments with an accuracy of 78%. On the societal level, the predicted values for the EQ-5D-5L health states ranged from -0.376 to 1. Health state preference varied greatly between groups. This was largely due to differences in the anchoring (i.e. the range of the utility scale respondents used), while there was near consensus on the relative importance of the five EQ-5D dimensions between groups. Demographic characteristics explained only a small proportion of the variability. CONCLUSION: Using the OPUF approach, we were not only able to estimate a new EQ-5D-5L value set for the UK, but also to examine the underlying individual preferences in an unprecedented level of detail.

46. **Jack Elliott** (Health Organisation, Policy and Economics, The University of Manchester), Anneliese Roberts (Health Organisation, Policy and Economics, The University of

Manchester); Luke Munford (Health Organisation, Policy and Economics, The University of Manchester); Saima Ahmed (The University of Manchester); Alison Littlewood (The University of Manchester); Chris Todd (The University of Manchester)

The impact of Covid-19 lockdowns on the mental health of homeworkers

Background: Lockdown measures used to combat the spread of Covid-19 have resulted in a shift from working in traditional workplace settings to remote working. While not commuting has left some homeworkers with more free time to focus on their health, it has also limited opportunities for socialising with colleagues and has forced some to work in impractical spaces. It is therefore unclear how this change in working environment has affected the mental health of workers. Likewise, it is unclear whether homeworking has affected certain populations differently and whether it has exacerbated any pre-existing health inequalities. Methods: We utilised a sample of 7541 individuals who were employed and took part in both the annual and Covid-19 UK Household Longitudinal Study surveys. We estimated average treatment effects using propensity score matching comparing those that only started working from home during lockdown to those that did not work from home before or during lockdown. We examined the effect of homeworking on the probability of having mental health problems and being lonely at several time points after lockdown measures were introduced in March 2020. We stratified our analysis by individual characteristics (e.g., household composition, deprivation, age) to examine how these effects differ by sub-populations. Results: Immediately after Covid-19 restrictions were introduced (April 2020), homeworking increased the probability of having mental health problems by 8.0 percentage points (95% CI = 2.9, 13.1) but had no statistically significant effect on the probability of being lonely. By the third national lockdown (January 2021), the positive effect on having mental health problems had decreased to 4.5 percentage points (95% CI = 1.0, 7.9) and the effect on being lonely had increased to 4.3 percentage points (95% CI = -0.6, 9.2). For each time point examined, the positive effect on the probability of having mental health problems was larger for individuals living with children. Conclusion: The negative effects of homeworking on mental health suggest that employers should promote homeworker health. This could include permitting employees to have flexible working hours and encouraging them to take regular breaks. This would be particularly important for those balancing work with childcare responsibilities.

47. **Edward Kendall** (NHS England)

Predicting Covid-19 admissions

The risk that admissions overwhelm hospital capacity is a key concern during the Covid-19 epidemic. Both the disease and related policy interventions are new, making prediction of hospital capacity pressures challenging. This paper sets out two interrelated elements of the operational analytics developed by the NHS as a response to Covid-19. The first is an agent-based simulation of infection using the Open-ABM from Oxford University, updated to reflect best working knowledge of the disease and calibrated to current sitrep data on hospital admissions. Simulations using specified parameters provide scenarios for future disease spread at an Integrated Care System level, and can explore changes in person-level mixing, compliance to non-pharmaceutical interventions, roll-out and/or effectiveness of vaccination and waning immunity. The second is a machine learning forecast using bayesian

hierarchical modelling to project admissions three weeks in advance. This technique allows forecasts to combine specific trust-level information with a range of leading indicators (e.g. testing data, 111 calls, mobility data), data from local hospitals and epidemiologically-driven priors derived from the agent-based simulation. Forecasts are consistent across the different geographical levels of the hierarchy, which supports national incident response decision-making in conjunction with local intelligence and other data sources. These tools have been developed and iterated over the epidemic in response to immediate operational pressures. The use of such analytics in an operational response is novel within the NHS. We discuss future applications for similar modelling (e.g. winter applications, elective recovery and non-Covid-19 infection response) as well as the limitations and safety measures built into our approach.

48. **David Meesters, John Buckell** (University of Oxford), Thomas Hancock (University of Leeds)

Decision field theory for understanding health economic choice behaviour

Background In health economics, discrete choice experiments (DCEs) are almost exclusively analysed using random utility maximisation (RUM). Recent studies indicate alternative behavioural assumptions may be more appropriate in health, such as random regret minimisation (RRM). Decision field theory (DFT) is a psychological theory of decision-making, promising in transport economics. This study introduced DFT to health economics, and empirically compared DFT to RUM and RRM. Methods Data from a DCE of tobacco choices were analysed. Attribute-only (base) models, models with deterministic heterogeneity, and latent class models were estimated. Model fit was compared between RUM, RRM and DFT using non-nested likelihood-based Vuong tests for differences in model fit. Parameter ratios, predicted choice shares, and pseudo-elasticities were computed. Bootstrapped standard errors and hypothesis tests for model differences were derived. The presence and impacts of decision rule heterogeneity were investigated using novel latent class models developed in this study. Results Model fit of DFT was significantly higher than RUM and RRM in base models (Vuong tests: $p<0.001$, for both comparisons). In models with preference heterogeneity, DFT again outperformed RUM for latent class models ($p=0.0143$), but this was not significant in models with deterministic interactions ($p=0.2819$). Parameter ratios, predicted choice shares and pseudo-elasticities significantly differed for both DFT and RRM, compared to RUM. The presence of decision rule heterogeneity within the sample was shown, especially between RRM and DFT ($p=0.0125$). Conclusions Tobacco choices were better depicted using DFT in this DCE, compared to RRM and RUM. Contributions were made to the literature by deriving standard errors and test-statistics for model differences using bootstrap methods, and by deriving latent class, decision rule heterogeneous, DFT models. The significant differences demonstrate that care should be taken when choosing a decision rule in health-based choice models, but further evidence is needed for generalisability.

P O S T E R A B S T R A C T S

Wednesday 5th January 2022 – Poster Session 1 & Welcome Drinks 1730-1830

1. **Laura Gray, Monica Hernandez Alava (ScHARR, University of Sheffield).**

   Mapping from the Oxford Knee Score (OKS) Score to EQ-5D-3L: Before and After Treatment

   Background: The Oxford Knee Score (OKS) is a 12 item patient reported outcome designed to assess function and pain after knee replacement. It is routinely collected before and after surgery, however, data on preference-based measures (PBMs), such as the EQ-5D-3L, are less regularly collected. The EQ-5D-3L includes a utility score made up from multiple dimensions and a valuation meaning it is preference based. PBMs are needed to calculate QALYs and for use in economic evaluation. The National Institute for Health and Care Excellence (NICE) recommend that, when a PBM is unavailable, mapping is used to convert disease specific health related quality of life (HRQoL) measures onto a PBM such as the EQ-5D. Objectives: We develop an accurate utility mapping from the Oxford Knee Score (OKS) to the preference based EQ-5D-3L. Methods: We use data on over 135,000 patients from the Patient Reported Outcome Measures (PROMs) which measures health gain in patients before and after knee surgery (as well as surgery from other conditions). We map from the disease specific Oxford Knee Score (OKS) to the preference based EQ-5D-3L using both, direct mapping (modelling EQ-5D-3L utility score directly) and indirect mapping (modelling the EQ-5D-3L responses to the five dimensions). Specifically, we compare response mapping using ordered probit models with direct mapping using two types of mixture models (betamix and ALDVMM). We also compare the stability of the mapping functions before and after surgery and investigate potential sources of differences. Results: We find significant differences between the preferred models estimated using pre- and post-operative samples. Response mapping predicts well in some parts of the EQ-5D-3L distribution. The mixture models predict more accurately, particularly at higher levels of EQ-5D-3L and in the pre-operative sample. Conclusions so far: We find that the same utility mapping is unlikely to be accurate across both pre-operative and post-operative samples. This could have important implications for mapping in this and other settings. Work is ongoing to determine why these differences occur, whether they stem predominantly from certain dimensions, which parts of the distributions are most affected or whether there is unobserved heterogeneity effecting OKS score, but not EQ-5D-3L.

2. **Koonal Shah (NICE), Stefan Lipman (Erasmus University Rotterdam), Simon McNamara (BresMed; University of Sheffield), David Mott (Office of Health Economics), Vivian Reckers-Droog (Erasmus University Rotterdam), Paul Schneider (University of Sheffield).**

   Conceptual issues in the valuation of health states in children

   The methods for valuing health states in children are much less established than those for valuing adult health states. This is in part because the elicitation of preferences for child health state poses many normative, ethical and practical challenges. This paper seeks to

examine the conceptual issues in the valuation of health states in children, addressing the following questions: (1) Normative theories of health state values: what are we attempting to elicit? (2) Sources of preferences: whose preferences should we elicit, and from which perspective? (3) Valuation methodologies: how should we elicit preferences? (4) Attaching different values to child and adult health: is a lack of consistency problematic? The paper will draw on desk research (non-systematic literature reviews) undertaken by the study team and findings from a two-part workshop, held virtually in April 2021. The workshop was attended by 25 participants, covering expertise in health economics, health state valuation, child health, HTA decision-making, and ethics. Workshop participants identified a lack of consensus on what we are eliciting (for both adults and children). They also judged that of the many candidate sample types, perspectives and methods, only a few are relevant, acceptable and feasible in the child health context. There were diverging views on the issue of having adult and child value sets with different properties. The paper will describe normative positions on the valuation of health states and their theoretical foundations. It will then summarise the different methodological approaches that can be used to value health states in children, including arguments for and against each approach. Arguments based on empirical claims will be disentangled from those that depend on subjective value judgments. The question of whether value sets for children and adults can be compared and integrated will then be explored. The paper will conclude by proposing a research agenda, including both empirical and conceptual work, to inform future methodological development. We are keen to receive feedback from HESG participants and hear their views on any other research and considerations that would help an agency like NICE to make recommendations about how child utility

3. **Christine Halling (1), Morten Hylander Møller, Søren Marker (2,3), Mette Krag (4), Jakob Kjellberg (1), Anders Perner (2,3), Dorte Gyrd-Hansen (5). 1. VIVE – The Danish Center for Social Science Research, Herluf Trolles Gade 11, 1052 København K, Denmark. 2. Department of Intensive Care, Copenhagen University Hospital, Rigshospitalet, Copenhagen, Denmark. 3. Centre for Research in Intensive Care (CRIC), Copenhagen University Hospital, Rigshospitalet, Copenhagen, Denmark. 4. Department of Intensive Care, Holbæk Hospital, Holbæk, Denmark. 5. Danish Centre for Health Economics (DaCHE), Department of Public Health, University of Southern Denmark, Odense, Denmark.**

The effects of pantoprazole vs. placebo on 1-year outcomes, resource use and labour market affiliation in ICU patients at risk for gastrointestinal bleeding - a secondary analysis of the SUP-ICU trial

Purpose: Patients in intensive care units (ICUs) are at risk of stress-related gastrointestinal (GI) bleeding and stress ulcer prophylaxis (SUP), including proton pump inhibitors, is widely used in the attempt to prevent this. In this secondary analysis of Stress Ulcer Prophylaxis in Intensive Care Unit (SUP–ICU) trial, we assessed 1-year outcomes in the pantoprazole vs placebo groups. Health economic analyses of resource use and labour market affiliations after hospital discharge adds insight into the wider implications of health care interventions and may serve as a proxy for any health consequences of an intervention after discharge. Methods: In the SUP–ICU trial, 3298 acutely admitted ICU patients at risk of GI bleeding were randomly allocated, stratified for site, to pantoprazole or placebo. In this secondary analysis, we assessed clinically important GI bleedings in ICU and 1-year mortality, health care resource use (e.g. readmission with GI bleeding, use of home care and general

practitioner), health care costs, and labour market affiliations in the Danish participants using registry data. Results: Among the 2,099 Danish participants, 2,092 had data in the registries; 1,045 allocated to pantoprazole and 1,047 to placebo. The number of clinically important GI bleedings in ICU was 1.9 percentage points [95% CI: 0.3-3.5] lower in the pantoprazole group vs. the placebo group, but none of the 1-year outcomes differed statistically significantly between groups, including total health care costs (€1954 [-2992 - 6899]), readmission with GI bleeding (-0.005 admissions [-0.016 - 0.005]), 1-year mortality (-0.013 percentage points [-0.051 - 0.026]), and employment (-0.178 weeks [-0.390 - 0.034]). Conclusions: Among ICU patients at risk of GI bleeding, pantoprazole reduced clinically important GI bleeding in ICU, but not 1-year mortality, health care resource use or increased labour market affiliation.

4. **Harry Hill, Ben Kearns (ScHARR, University of Sheffield), Stephen Duffy (Barts and the London School of Medicine and Dentistry, Queen Mary University of London).**

   Estimating the cost-effectiveness of risk stratified breast cancer screening in the UK

   Background: The National Health Service Breast Cancer Screening Programme (NBCSP) invites women aged 50–70 years to attend for 3-yearly mammograms. Most other countries invite women to biennial screening. Disparities across countries exist in the status of implementation due to considerable debate around the harms and benefit of breast screening. One approach that may improve the harms to benefit balance is to risk-stratify breast cancer screening. Aims: To evaluate the cost effectiveness of NBCSP in comparison to three proposals for risk stratified screening developed by independent research groups (ASSURE, PROCAS and BRAID). The proposals differ by their recommendations for: cancer screening instruments, frequency of screening, number of risk groups, risk assessment tools and risk thresholds used to assign woman to risk groups. Methods: A de novo discrete-event simulation was developed to simulate population level screening in cohort of woman who are followed over their lifetime. Health related quality of life, cancer survival and treatment costs are estimated in the model and depend on cancer stage (non-invasive cancer and four invasive cancer stages), age at cancer detection and duration of time since the cancer was detected. Tumour detection at screening was modelled to be dependent on breast density and tumour size. The main mechanism of generating a benefit of screening in the model is a stage-shift; screen detected cancers are assigned an earlier stage. Harms of screening are overdiagnosis (i.e. women who receive treatment for cancers that would have never presented symptomatically without screening), pain incurred during mammography screening and false positive results, all of which incur a QALY loss. Model outcomes were validated against audit data from NBCSP. Results: Preliminary results show regimens where additional screening is only offered to women above a certain risk level increases cost per QALY gained compared to NBCSP. Not offering breast cancer screening to women at low risk further improves the cost-effectiveness of the screening program by reducing population harms accountable to screening. Conclusion: Our analysis demonstrates that risk stratified breast cancer screening may be beneficial for women, but cost-effectiveness will depend on the particular risk-based strategy.

5. **Elizabeth Lemmon, Peter Hall, Katharina Diernberger (University of Edinburgh), Steve Clark (Bowel Cancer Intelligence UK Public Patient Group), David Henderson (Usher Institute, University of Edinburgh), Alasdair Rutherford (University of Stirling).**

   Utilisation of social care services by patients aged 50 and over diagnosed with colorectal cancer in Scotland

   Increasingly, due to welcome improvements in diagnosis, treatment and survival, cancer is recognised as a disease that extends long after treatment has ended. Despite this, we know very little about how much support people living with and surviving cancer receive, especially in the case of social care support (also known as long-term care). This evidence is important in order to explore both met and unmet care needs for those living with and surviving cancer. Further, an understanding of utilisation, including the interaction between health and care services, is necessary to optimally plan for future service provision. Finally, an understanding of the need for care services in the long-term and the potential cost implications is crucial evidence to inform economic evaluations. One reason for the limited evidence in this area may be due both to the lack of social care data and the difficulties in linking such data to other sources. Scotland is unique in both respects. Firstly, Scotland routinely collects information on older people who use social care services. Secondly, Scotland's data linkage infrastructure allows social care data to be linked to other health care data sets, including cancer registry data. In this project, we use a unique linked dataset containing routine social care, hospital and cancer registry data to explore the utilisation of social care services for people aged 50 and over, living with and surviving cancer in Scotland. To our knowledge, this is the first time the social care use of patients affected by cancer has been documented in Scotland. In particular, we focus on colorectal cancer. The proposed methodology includes a matched cohort approach and a two-part model of utilisation. The richness of the linked datasets will allow us to account for other contributory factors including comorbid conditions. Our analysis will allow us to explore the utilisation of social care services with a view to understanding any cost implications.

6. **Akbar Ullah, William Whittaker (Manchester Centre for Health Economics, The University of Manchester).**

   A longitudinal analysis of factors associated with COVID-19 spread in care homes

   Background: Nursing and residential homes ('care homes') care for some of the most vulnerable people in society. Care home residents are at greater risk of becoming seriously ill if contracting COVID-19. Current literature has found excess deaths in care homes during the pandemic and explored the association of this with the time invariant characteristics of care homes. In this paper we add to the existing literature by assessing the relationship of both care home time-invariant and time-variant characteristics with the number of COVID-19 symptoms and/or confirmed cases in care homes, particularly focusing on the role of staff, PPE and local area COVID-19 cases in controlling/spreading the virus into homes. Methods: Daily data on care home staffing levels, staff-self-isolating, occupancy levels, residents with symptoms and/or tested positive, issues in accepting new placements and Personal Protective Equipment (PPE) availability were provided by Greater Manchester Health and Social Care Partnership via COVID-19 dashboards for the period April to December 2020 covering 550 care homes in Greater Manchester. The data were linked to CQC care home

register. Middle Super Output Area (MSOA) level weekly COVID-19 confirmed cases data were merged to account for the COVID-19 situation in the local area of care home. Negative Binomial and Zero-inflated Negative Binomial regression models were estimated to test for associations between home time-invariant characteristics and COVID-19 symptoms/cases per occupied bed. To study changes in COVID-19 in care homes and associations of this with time-variant care home measure, Logistic and Poisson models were estimated. Results: Care homes affiliated with brands/chains experienced significantly fewer COVID-19 symptoms/cases compared to independent homes. Care homes that contained at least some residents with dementia, learning disability and/or autism and charity-run homes experienced higher COVID-19 symptoms/cases, respectively. The number of staff self-isolating and COVID-19 cases in the local area were associated with greater COVID-19 spread in care homes. Enough PPE supply was not associated with COVID-19 spread in care homes. These findings give important insights into the drivers of COVID-19 in care homes, highlighting areas with greater need for resources and support.

7. **Habtamu Beshir, Eleonora Fichera (Department of Economics, University of Bath).**

Impacts of Low Emission Zones on Air Pollution, Health and Well-being: Evidence from England

Background: Epidemiological studies link air pollution, particularly PM10, to cardiovascular diseases (CVDs). Air pollution is also linked to mental well-being (Zhang et al., 2017). However, there is not much evidence on which environmental policies are effective in improving health and wellbeing. Few studies provide causal evidence on the effectiveness of Low Emission Zones (LEZ) in Germany (Margaryan, 2020 and Pestel and Wozny, 2019). But they do not focus on well-being and cannot account for a rich set of potential confounders. In this study we investigate the effects of Greater London's 2008 LEZ and Central London's 2019 Ultra-Low Emission Zone (ULEZ) on health and well-being. ULEZ is the toughest policy of any city in the world as it requires strict emission standards. Data and Methodology: First, we use postcode level data from Transport for London to identify the areas exposed to LEZ ad ULEZ. Second, we use 2005-2019 daily data from the U.K. Air Quality Archive containing information on NO2 and PM10 pollutants. Third, we use the Quarterly Labour Force Survey and Annual Population Survey to investigate the health effects of LEZ and ULEZ. These surveys contain individual level health information and rich socio-economic characteristics. We then use a difference-in-differences approach exploiting the time of introduction of LEZ and ULEZ and comparing exposed areas in Greater London and Central London to comparable unexposed cities in England. Results: We find that LEZ did not reduce NO2, but it decreased PM10 (by 19% to 33%). Moreover, ULEZ significantly reduced both NO2 (by 21%) and PM10 (by 26.8%). Furthermore, LEZ reduced the probability of having long lasting health problems by 3%; having life limiting health problems by 12%; and suffering with CVD by 6%. ULEZ significantly improved self-assessed health and well-being of individuals working in central London. Exposed individuals are less likely to report having long lasting health problems by 9%; CVD by 9%; heart, blood pressure, blood circulation problems by 10%; and general bad health by 2%. These individuals are also more likely to report feeling worthwhile by 1.2% and satisfied by 1%, but less likely to report feeling anxious by 3%.

8. **Ed Webb, Paul Kind (AUHE, University of Leeds).**

   Tracking the evolution of EQ-5D values due to demographic change over a 50-year period

   Background: National EQ-5D value sets are used in healthcare resource allocation, with the justification that they represent the general public's preferences. Value sets can remain in use for a long time, e.g. the UK uses values from 1993. There are concerns that over time, value sets may no longer reflect the public's preferences, but there is little understanding of why and how preferences evolve over time. Many disparate factors could have an influence, including demographic changes, evolving societal attitudes and advances in preference measurement technology. We present a method which disentangles the influence on EQ-5D value sets of demographic shifts, e.g. ageing populations, from other sources, e.g. changing attitudes or different measurement techniques. Methods: In 2018 an EQ-5D-5L valuation exercise was carried out using a discrete choice experiment (DCE) with values anchored to the full health=1, dead=0 scale using a visual analogue scale (VAS) exercise. The influence of two sets of demographic characteristics was estimated: (1) age and gender; (2) several characteristics including age, gender, occupation and long-term health conditions. For (1), DCE responses were analysed using multinomial logit, for (2) they were analysed using the least absolute shrinkage and selection operator (LASSO). In both cases VAS responses were analysed using linear regression. Data from the Office for National Statistics was used to re-weight values to match the UK population's characteristics in terms of the first set of characteristics (age/gender) in each year from 1990-2040. The Health Survey for England was used to re-weight values to match the population in terms of the second set of characteristics in each year from 1993-2018. Results: All demographic characteristics influenced respondents' valuation of at least one EQ-5D-5L level. However, values remained largely stable over time. The greatest changes from 1990-2040 were for anxiety/depression level 4, at -0.016, and self-care level 4, at -0.010. Including a wider range of characteristics sometimes influenced whether the utility decrement of a level increased or decreased over time. Conclusion: No evidence was found that demographic shifts affect EQ-5D-5L values, even over a 50 year period. The method is generalizable, and similar exercises could inform future EQ-5D life-cycle research.

Thursday 6th January 2022 – Poster session 2 1700-1830

9. **Catherine Campbell, Igor Francetic (University of Manchester)**

   Outcomes for university students following emergency care presentation for deliberate self-harm

   Background: Attending university can be a particularly challenging time for mental health, especially when living far from the social networks developed during early adolescence. Deliberate self-harm (DSH) is among the most common reasons for visiting emergency departments for these young adults, and a strong predictor of successive suicide attempts. Patients presenting for emergency care for DSH often experience more negative staff attitudes and poorer care, compared with patients seeking care for alternative reasons. Quality of care in these situations may also be impacted by the crowding pressures or by other patient, provider or hospital-specific characteristics. However, the existing evidence

on this quality deficit comes from small-scale, local studies that have considered only a limited range of factors, and have not considered students. Aim: To investigate factors associated with emergency care outcomes among self-harm patients, and compare student and non-student populations. Methods: We obtained data for patients presenting at all 130 A&E departments in England with DSH from Hospital Episode Statistics during 2017/18. We identified probable students based on a set of key individual characteristics: age, registered GP, and area of residence. We used multivariable regression models to relate student status to emergency care outcomes controlling for other patient characteristics, time of attendance, levels of crowding, and hospital fixed effects. Results: We identified 3,251 DSH attendances among university students, representing 5.27% of total DSH attendances. We found that students attending an emergency department for a DSH episode were more likely than non-students to attend out-of-hours and to be discharged with no follow-up. Students were also less likely to be referred to another healthcare provider. Moreover, students attending for a repeated self-harm episode were more likely to have an unplanned follow-up within seven days. Conclusion: The way in which DSH patients are treated during a visit to an emergency department has consequences for their future health-seeking behaviour. Our results suggest that there are differences in emergency care outcomes when comparing students and non-students. These findings have potentially important policy implications that call for further research into emergency care of DSH and broader mental health support interventions provided by universities and the NHS.

10. **Jeanne Armand, James Gaughan, Nils Gutacker (Centre for Health Economics, University of York), Luigi Siciliani (Centre for Health Economics, University of York and Department of Economics and Related Studies, University of York).**

Differences in length of stay and health outcomes between public and private providers in England

Aims: In the last two decades, an increasing proportion of elective patients funded by the NHS have been treated in the independent (private) sector. Provider incentives towards quality and efficiency may differ between private and public providers, which in turn can affect the willingness of public funders to contract with private providers. However, comparing quality and efficiency across public and private providers can be difficult given that private providers treat less complex patients. This study investigates differences in length of stay, as a proxy of efficiency, and health outcomes, as a proxy of quality, between private and public providers in England. Data: We analyse all elective hip and knee replacement surgery patients treated in the English NHS between April 2014 and March 2019 who completed patient reported outcome measures (PROM) questionnaires (N = 212,067 and 234,213 respectively). Patient demographic (age, sex, deprivation) and clinical (pre-operative health status, symptom duration and long-term conditions) characteristics are derived from Hospital Episodes Statistics and PROM survey data. Methods: For each treatment, length of stay and health outcomes are modelled with OLS and 2SLS. In addition to including a rich set of patient covariates, we instrument the probability of being treated by a private provider with the differential distance between patient residence and the nearest private and public provider to control for unobserved patient casemix. Results: For hip replacement, private providers have 0.72 days (20.1%) shorter length of stay and 1.11 points (2.8%) higher Oxford Hip Score before accounting for unobserved patient heterogeneity. After instrumenting for patient selection, private providers have 0.34 days

(9.4%) longer length of stay and 1.41 points (3.5%) higher Oxford Hip Score. Similarly, for knee replacement, private providers have 0.85 days (22.4%) shorter length of stay and 0.88 points (2.5%) better Oxford Knee Score before accounting for unobserved patient heterogeneity. After instrumenting for patient selection, private providers have 0.29 days (7.5%) longer length of stay but no statistically significant difference in health outcomes. Conclusions: Private and public providers differ in length of stay and health outcomes. Unobserved patient heterogeneity affects the comparison of private and public performance.

11. **James Durrand, Angela Bate (Northumbria University), Basem Al-Omari (Khalifa University), Garry Tew, Alasdair O'Doherty (Northumbria University), Gerry Danjoux (South Tees Hospitals NHS Foundation Trust), Patrick Doherty (University of York).**

An application of an adaptive-choice DCE as an alternative to a 'traditional' DCE to elicit patient preferences.

Background: Discrete Choice Experiments (DCEs) are widely used in health service evaluations to elicit patient preferences. Nevertheless, they are not without their limitations. DCEs often require large sample sizes or a repetitive number of choices per respondent if they incorporate a range of attributes and levels and face the challenges of respondents adopting simplifying decision-heuristics and non-compensatory decision-making. Adaptive-choice DCEs attempt to overcome some of these limitations by customising the choices sets to the preference of individual respondents, identifying a-priori, the attributes and levels that respondents' 'must-have' or that are 'unacceptable'. This paper presents an application of an adaptive-choice DCE to elicit preferences for an intervention where strong underlying preferences were likely to drive choice. Intervention: Prehabilitation support focuses on enhancing physical and mental health before major surgery and has been shown to improve perioperative outcomes. Traditionally, prehabilitation support has been delivered face-to-face but Covid-19 has brought the need for robustly developed 'home-based' alternatives sharply into focus. Understanding preferences is key to developing home-based interventions able to effectively engage and support patients. Methods: We developed an Adaptive Choice-Based Conjoint (ACBC) questionnaire through Sawtooth Software lighthouse suite (Provo, Utah, USA). Basic demographic, surgical and health-risk behaviour data were collected. The DCE comprised 6 attributes with 14 levels. Patients preparing for major surgery were invited to participate at 10 NHS sites. A Hierarchical Bayes (HB) model was used to estimate: (a) the relative importance of each attribute and (b) utilities of each level of each attribute. Furthermore, segmentation analysis was used to identify specific groups of respondents whose preferences differed significantly. Results and Discussion: 173 participants consented with 164 questionnaires completed (completion rate 94.8%). The relative importance of attributes revealed that 'programme format' (digital or paper) was most important. Level utilities indicated a paper-based programme, that could be commenced at home with a fortnightly review and integrating a wearable device was most acceptable to the cohort overall. However, programme format was divisive, with patients segmented into those exhibiting strong preferences for a digital format versus those preferring a paper-based format. This study demonstrates the feasibility of utilising adaptive choice DCE's.

12. **Katie Spencer (AUHE, University of Leeds), Peter Hall (University of Edinburgh), Galina Velikova (University of Leeds), Wilbert van den Hout (Leiden University Medical Center, The Netherlands), Paul Kind (AUHE, University of Leeds), Yvette van der Linden (Leiden University Medical Center, The Netherlands), Sandy Tubeuf (IRSS-IRES, Université catholique de Louvain).**

    Self-reported overall health near the end-of-life: how does it relate to the five EQ-5D domains and time-to-death

    Introduction: Considerable debate exists about the measurement and valuation of quality of life when life-extension is no longer possible. Theoretical and normative arguments are made, supported by empirical qualitative data, that as individuals near the end of life the domains of importance vary. Previous studies have assessed how self-reported health varies over time in relation to aging but no quantitative empirical evidence is available to support this in the context of death due to chronic disease. Methods: Using longitudinal data from the Dutch Bone Metastasis Study we assess how self-reported overall health, as measured by the EuroQol-visual analogue scale (EQ-VAS), changes with respect to the EQ-5D domains for patients with advanced cancer as they near the end-of-life. Results: We find that the probability of a level 3 (severe) domain response in any EQ-5D domain (mobility, self-care, pain/discomfort, usual activities, anxiety/depression) rises near the end-of-life with “no problems” becoming the least likely. Self-reported overall health falls near the end-of-life with a more rapid decline in the final few months of life occurring independently of the five EQ-5D domains; the EQ-VAS associated with “no problems” falls sharply in the final few months of life. In addition, the incremental overall health associated with the domain levels is reduced as patients near death. Conclusions: As individuals near death, whilst their actual time-to-death remains unknown to them, their self-reported health diminishes independently of their reported EQ-5D-3L domains. This suggests that other dimensions, not captured by the ED-5D-3L may be increasingly important contributors to patient self-reported overall health towards the end-of-life. These empirical data support ongoing studies which aim to expand and/or supplement the EQ-5D-3L near the end of life.

13. **Zixuan Zhao, Hengjin Dong (School of Public Health, Zhejiang University).**

    Modeling the Cost-Effectiveness of Lung Cancer Screening: Policy Guidance Based on Patient Preferences and Compliance in China

    Objective：Lung cancer is the most commonly diagnosed cancer and the leading cause of cancer-related deaths in China. The effectiveness of screening for lung cancer has been proved to reduce lung cancer specific and overall mortality. Most lung cancer models to date have assumed "ideal conditions" with a compliance rate of 100%, and the effects of lung cancer screening tests have been assessed only under these conditions. This study aimed to assess cost-effectiveness incorporating real-world patient preferences and compliance. Methods: A Markov state-transition model was built to assess the cost-effectiveness of lung cancer screening programs in China. The evaluated screening scenarios consisted of different combinations of screening tool, and interval of screening. Effectiveness values were obtained through a literature review, and cost parameters were derived from databases of local medical insurance bureau. A healthcare system perspective was adopted. Initial screening compliance and compliance with clinical diagnostic tests was derived from

an existing screening program. The outputs of the model included costs, life-years and quality-adjusted life years (QALYs), with future costs and outcomes discounted by 3%. The incremental cost-effectiveness ratio (ICER) was calculated for the different screening scenarios relative to no screening. The willingness-to-pay threshold of CNY 208k per QALY gained (the accepted threshold in China) was applied. Expected outcome: QALYs and cost of screening incorporating patient preferences and compliance； Reduction in mortality from increasing compliance with different scenarios.

14. **Samuel Hugh-Jones, Matt Sutton, Rose Atkins, Stephanie Gillibrand (University of Manchester).**

    Does the timing of parental divorce or separation impact adolescent mental health differently by gender?

    Mental health issues are increasing in prevalence, particularly in children and adolescents (up to 2 in 5 young people by some estimates), and many studies have linked parental divorce and separation to poor mental health outcomes among children. However, little is known about whether the timing of separation matters and on whether the impact depends on the gender of the child. We extend the current literature by assessing whether the impact of divorces differs by gender and divorces occurring at different ages in a young person's life. We utilise data on 9133 individuals from the Next Steps study (formerly Longitudinal Survey of Young People in England) – a longitudinal study which collected data across many topics from family life and education to mental health from a representative sample of young people in England between ages 14 and 25. We use seemingly unrelated regression estimation to determine the relationship between parental divorce occurring prior to or during adolescence on self-reported GHQ-12 mental health scores at ages 15, 17, and 25. We find a clear difference across genders in the impact of the timing of parental separation on mental health – for girls, the negative impact appears more immediate and acute, particularly on age 15 mental health (β=0.247 for divorce at age 14-15), whereas for boys, the impact seems delayed, and is larger for age 25 mental health (β=0.107 for divorce before age 14). We undertake a range of sensitivity analyses and robustness checks, specifically by including a variable of time spent together as a family to give some element of family context, and including dummy variables for other family constructs (single parent and widowed households) in order to isolate the effect of divorce and separation. We find our results to be relatively robust. Our findings suggest there is scope for targeted mental health interventions to vary in timing by gender, in order to mitigate potential impacts of parental divorce and separation.

15. **Rory Cameron (Univ. of East Anglia), J. Abbott (Univ. of Central Lancashire), N.J. Simmonds, S.B. Carr (Imperial College London), J.A. Whitty (Health Economics Group, Univ. of East Anglia).**

    Patient valuation of health-related quality of life associated with treatment burden and pulmonary exacerbation in cystic fibrosis

    Background: This study focuses on two patient-centred outcomes (pulmonary exacerbation and treatment burden), both high priority concerns for people with cystic fibrosis (CF). They

are inadequately considered in economic evaluations of CF interventions. We aimed to improve our ability to value these outcomes, and to facilitate their systematic inclusion in economic evaluations and funding decisions. Method: Adults attending a single large CF centre in England were invited to participate in remote video-call interviews. A time trade off (TTO) methodology based on the EQ-VT v2 protocol was used to value five structured-format health state vignettes, and participants' current health. Protocol and development of the vignettes was guided by patient involvement. The vignettes included a 'base-case' CF state (ppFEV1 = 68%; 1 pulmonary exacerbation/year; 3 inhaled medicines/day; 2x 20 minutes physio/day; 30 enzyme tablets/day; 4 additional medicines/day), and variants of this, reflecting: no exacerbations; 3 exacerbations/year; an additional physio session; an additional nebulized medicine. Participants also completed the EQ-5D-5L questionnaire. Data were analysed using a random intercept model. Results: 51 adults with CF participated in the study: median age (range) 33 years (18-66); 53% female; mean ppFEV1 (SD) = 66% (20.3). 33% gave inconsistent responses to one or more TTO tasks. Exclusion of inconsistent responders did not impact the relative magnitude of utility estimates. The mean (SD) utility values for participants' own health were 0.81 (0.20) as measured by the EQ-5D-5L, and 0.82 (0.20) as measured by the TTO. The (full sample) disutility estimates were: -0.037 per additional exacerbation ($p<0.001$); -0.029 for an additional daily physiotherapy session ($p=0.04$); -0.019 for an additional daily nebulized medication ($p=0.14$). Conclusion: Estimates from a 2015 study by Acaster suggest deterioration from mild to moderate disease equates to a disutility of -0.046. Set against this context, our results underscore the significant impact of treatment burden and pulmonary exacerbation on quality of life in CF. The study demonstrates the feasibility of patient valuation of health states related to pulmonary exacerbation and treatment burden in CF and provides supporting information for the design of larger valuation studies powered to assess disutility associated with these health states.

16. **Xueshan Sun, Hengjin Dong (Zhejiang University), Chris Bojke, Ruben Mujica-Mota, Daniel Howdon (AUHE, University of Leeds).**

Association between health-related quality of life and WOMAC among patients with osteoarthritis in Zhejiang province, China

Background: Osteoarthritis (OA) is a chronic disease which brings great damage to patients' quality of life. Western Ontario and MacMaster Universities (WOMAC) Osteoarthritis Index is a popular disease specific instrument for measuring quality of life of OA patients. Few studies have investigated the relationship between disease specific health-related quality of life (HRQoL) assessments of patients with OA in China and preference-based utility scores suitable for informing resource allocation decisions. The present study aims to estimate utility and WOMAC scores, and explore their association among OA patients. Methods: Cross-sectional survey of OA patients in Zhejiang Province, China from June 2020 to May 2021. Questionnaire was consisted of: socio-demographic and health-related variables, WOMAC (Likert5.0) instrument, and five-level EuroQol five-dimensional questionnaire (EQ-5D-5L). EQ-5D-5L health states tariffs were obtained through a Chinese general population-based EQ-5D-5L value set based on the time trade-off (TTO) technique. Multiple linear regression models were applied to explore the association between WOMAC scores and EQ-5D-5L scores, and WOMAC and EQ-5D-5L VAS, after adjusting for covariates age, etc, overall and by BMI subgroup (light weight: BMI<18.5, normal: 18.5≤BMI≤ 24.9, overweight: 25≤

BMI≤29.9, Obese: BMI≥30). Results: A total of 952 patients were included, 61.03% of whom were female. Average WOMAC score, EQ-5D utility index and EQ-VAS were 38.95±13.03 (mean±SD), 0.752±0.222, and 70.37±11.45, respectively. Significant difference in terms of EQ-5D-5L score, and EQ-VAS can be found between patients with different BMI (p=0.002 and 0.013, respectively), and there was a tendency that patients with normal weight had higher HRQoL and lower WOMAC scores. The results of the final model (adjusted for age, educational level, ethnic group, marriage status, insurance, treatment, BMI, site of disease, course of disease) showed that HRQoL was significantly associated with WOMAC (B=-0.015, p<0.001), which was also found in the subgroups with different BMI. Conclusions: WOMAC was significantly associated with EQ-5D-5L utility scores regardless of BMI. Patients with normal weight tend to have better HRQoL and lower WOMAC scores compared with patients in other subgroups, therefore special attention should be paid to OA patients without normal weight to increase their HRQoL and decrease their WOMAC.

17. Sharvari Patwardhan, Matt Sutton, Marcello Morciano (University of Manchester).

The anatomy of a skewed tail: quantifying the long-term cost of a care home placement using administrative data for the Salford local authority

In England, almost 4% of people aged 65+ (one in seven aged 85+) live permanently in residential or nursing homes, with about half of them being private (nonsubsidized) payers not entitled to public funds for care costs. The government proposes to introduce a £86,000 cap on the amount anyone in England will need to spend on their personal care over their lifetime. Knowing the length of stay in care home settings and factors associated with its variation are prerequisites for estimating the lifetime costs and therefore the overall and distributive properties of such reform. However, individual administrative data on complete length of stay in care home settings are currently lacking. We use an innovative dataset of pseudo-anonymised integrated administrative records of care home residents from the Salford Care Homes Practice, a virtual specialised GP Practice established in 2009, to service care home residents in the Salford Local Authority (18th most deprived in England, 2019). We retrospectively examine the factors affecting the length of stay in 36 (out of 44) care homes (433 residents deceased in 2018). Controlling factors include resident's level characteristics (e.g age at registration, gender) and care home's level characteristics (e.g. setting, client and services provided). Combining length of stay with information about the unit (e.g. weekly) costs of a care home placement we estimate expected costs of care for people newly admitted to care homes. Care home residents in Salford experience a mean length of stay of 710 days (around 2 years) in care homes (a maximum of 3280 days i.e., around 9 years), with significant variation across care homes' settings (longer length of stay for residents in homes not providing nursing services) and gender of the residents (longer length of stay for women). The care costs analysis is yet to be finalised. There is a lack of routinely collected longitudinal resident-level data on the care home population and this research has the potential to provide a targeted analysis of the factors affecting the length of stay in care homes and the associated long term costs. Results will feed the debate on the long-term care funding reform.