incident CHD, on average 1.9% by each ACE. Estimated hazards of CHD are more likely to depend on ACEs combinations than counts of ACEs. For instance, those who experienced three ACEs (financial hardships, early-life parental separation, and hospitalisation) had 1.52 times higher hazard (95%CI: 1.10 to 2.12), while those who had four ACEs (poor parental attachment, financial hardships, parental harsh punishment, and early-life parental separation) had 1.31 times higher hazard (95%CI: 1.03 to 1.67), than those did not have ACEs.

Conclusion The findings of this study show that there is incremental risk of CHD in ACEs combinations. As the ACEs are more likely to co-occur, even if an individual ACE had no associations with increased risk of CHD, it is crucial to intervene in ACEs holistically. By taking away all types of ACEs, we estimated that 13% probability of developing CHD could be eliminated. This finding can be scientific evidence for early childhood framework for intervention to reduce health inequalities over life course, which are originated in early life.

Thursday 10 September

Non-Communicable Disease: Multi-Morbidity

OP27 **SOCIODEMOGRAPHIC AND LIFESTYLE PREDICTORS OF INCIDENT HOSPITAL ADMISSIONS WITH MULTIMORBIDITY IN A GENERAL POPULATION 1999–2019: THE EPIC-NORFOLK COHORT**

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Background The ageing population and prevalence of long-term disorders with multimorbidity is a major health challenge worldwide. Patients with multimorbidity account for a disproportionately high share of healthcare workload and costs and experience reduced wellbeing and quality of life. The associations between comorbid conditions and mortality risk are well established; however, few prospective community-based studies have reported on prior risk factors for incident hospitalisations with multimorbidity. Our study examines the independent associations for a range demographic, lifestyle and physiological determinants and the likelihood of subsequent hospital incident multimorbidity using a prospective community-based cohort of middle-aged and older men and women resident in Norfolk, UK. We explore demographic, lifestyle and physiological exposures including age and sex, body mass index, cigarette smoking, alcohol intake, educational attainment, occupational social class, physical activity, plasma vitamin C, total cholesterol, systolic blood pressure and common prevalent diseases.

Methods Incident hospital admissions with multimorbidity were examined in 25014 men and women aged 40–79 in EPIC-Norfolk, a British prospective population-based study initially recruited in 1993–1997 and followed-up until 2019. The determinants of incident multimorbidity, defined as Charlson Comorbidity Index ≥ 2, were examined in multivariable models for the 10-year period 1999–2009 and

repeated with independent measurements in a second 10-year period 2009–2019.

Results Between 1999–2009 18179 participants (73% of the population) had a hospital admission. Baseline 5-year and 10-year incident multimorbidity were observed in 11% and 21% of participants respectively. Age per 10-year increase OR 2.13 (95% CI 2.03–2.23) and male sex OR 1.28 (95% CI 1.17–1.39) predicted incident multimorbidity over 10 years. In the subset free of the most serious diseases at baseline, current smoking OR 1.71 (95% CI 1.53–1.91), BMI >30 kg/m² OR 1.37 (95% CI 1.24–1.51) and physical inactivity OR 1.09 (95% CI 1.00–1.18) were positively associated and plasma vitamin C (a biomarker of plant food intake) per SD increase OR 0.88 (95% CI 0.84–0.91) inversely associated with incident 10-year multimorbidity after multivariable adjustment for age, sex, social class, education, alcohol consumption, systolic blood pressure and cholesterol. Results were similar when re-examined for a further time period 2009–2019.

Conclusion Age, male sex and potentially modifiable lifestyle behaviours including smoking, physical inactivity and low fruit and vegetable intake were associated with increased risk of future incident hospital admissions with multimorbidity.

OP28 **MULTIMORBIDITY AND FIT NOTE RECEIPT IN WORKING AGE ADULTS WITH LONG-TERM HEALTH CONDITIONS**

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Background Research on sickness absence has typically focused on single diagnoses, despite increasing recognition that long-term health conditions are highly multimorbid and clusters comprising coexisting mental and physical conditions are associated with poorer clinical and functional outcomes. The digitisation of sickness certification in the UK offers an opportunity to address sickness absence in a large primary care population.

Methods Lambeth Datanet is a primary care database which collects individual level data on GP consultations, prescriptions, Quality and Outcomes Framework (QOF) diagnostic data, sickness certification (fit note receipt) and demographic information (including age, gender, self-identified ethnicity, and truncated postcode). We analysed 326,415 people's records covering a 40-month period from January 2014 to April 2017.

Results We found significant variation in multimorbidity by demographic variables, most notably by self-defined ethnicity. Multimorbid health conditions were associated with increased fit note receipt. Comorbid depression had the largest impact on first fit note receipt, more than any other comorbid diagnoses. Highest rates of first fit note receipt after adjustment for demographics were for comorbid epilepsy and depression (HR 4.0; 95% CI 3.4–4.6), followed by chronic pain and depression (HR 3.9; 95% CI 3.5–4.4) and cardiac condition and depression (HR 3.9; 95% CI 3.2–4.7).

Conclusion Our results show striking variation in multimorbid conditions by gender, deprivation and ethnicity, and highlight the importance of multimorbidity, in particular comorbid depression, as a leading cause of disability in the population. The findings highlight the importance of multi-morbidity, particularly comorbid depression, as the leading cause of disability among working age adults.

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Background An estimated 25% of GP patients within the UK have multimorbidity, a large proportion of which is attributable to non-communicable diseases, many of them preventable. The heterogeneity of existing study methodologies and definitions of multimorbidity limits comparisons to assess temporal trends. This study aims to use a large population-representative single dataset and disease list to describe changes over time in multimorbidity incidence and prevalence.

Methods We selected a random sample of 1m adults from the Clinical Practice Research Datalink (CPRD Aurum database) registered at participating GP practices within England between 2004 and 2019. We used two measures of multimorbidity: a) basic multimorbidity: two or more chronic conditions; b) complex multimorbidity: at least three chronic conditions affecting at least three body systems. A multidisciplinary team discussed the list of chronic conditions of interest, including long-term mental health conditions and chronic infections.

Using standard formulae, we calculated crude and age-sex standardised annual multimorbidity prevalence and incidence to assess trends over time. We also calculated the average age of onset for basic and complex multimorbidity. Analyses were conducted using R v3.6.3.

Participants will be linked to quintiles of the 2015 Index of Multiple Deprivation as a measure of area-level socioeconomic deprivation to describe socioeconomic inequalities in temporal trends.

Results Preliminary results show that age-sex standardised annual prevalence increased from 32.9% (95% CI: 32.7% - 33.1%) with basic multimorbidity and 14.9% (95% CI: 14.7%-15.0%) with complex multimorbidity in 2004, to 51.0% (95% CI: 50.8% - 51.3%) and 29.9% (95% CI: 29.7% - 30.1%) in 2019, or by 55.3% and 101.0% respectively.

Basic multimorbidity incidence per 10,000 person-years showed little change from 644 (95% CI: 631 – 658) in 2004 to 669 (95% CI 648 – 690) in 2019. There was an increase in the incidence of complex multimorbidity from 322(95% CI: 315- 330) to 418 (95% CI: 407 – 430).

The mean age of incident multimorbidity onset was 48.8 (95% CI: 48.7 – 48.8) years for basic and 57.5 years (95% CI: 57.5 – 57.6) for complex multimorbidity.

Conclusion The prevalence of both basic and complex multimorbidity has increased substantially over the last 15 years. Complex multimorbidity incidence and prevalence have increased more rapidly than for basic multimorbidity. This highlights the need for improved population-level prevention strategies to postpone and prevent the onset of long-term conditions. Our next step is to assess whether there are socioeconomic differences in these temporal trends.

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Background Previous research has indicated that effort reward-imbalance (ERI) is independently associated with retirement and cross-sectional multimorbidity. In addition, aging populations and pension reform across western societies has led to older adults who are at increased risk of aging related disease onset and progression, participating in the labour force for longer. The objective of this study was to examine the association between multimorbid chronic health trajectories and retirement in older workers experiencing high and low effort-reward imbalance.

Methods This study used longitudinal data from the Health and Retirement Study (2006–2016) and the English Longitudinal Study of Ageing (2004–2014) for adults aged 50–55 years. Group-based trajectory modelling was used to construct multimorbidity trajectories (0–6 of diabetes, hypertension, heart disease, stroke, lung disease and cancer) over a 10-year period separately for participants reporting low and high ERI at baseline. Logistic regression analysis fully adjusted for relevant variables examined the association between the multimorbidity trajectories and cross-sectional retirement at the final wave.

Results Mean ERI scores were higher in UK workers (low ERI = 0.75, high ERI = 1.38), compared to U.S. workers (low ERI = 0.67, high ERI = 1.32). Four trajectory classes were identified for U.S. workers with low ERI (no conditions, no-increasing, low-increasing, and high-stable). Compared to the no conditions trajectory, the high stable trajectory was associated with retirement (HR=4.50, 95%CI=2.08–9.62). Four trajectory classes (no-increasing, low-increasing, medium-stable, and high increasing) were identified for U.S. participants with high ERI. The medium-stable (HR=3.14, 95%CI = 1.19–8.29) and high-increasing (HR=4.52, 95%CI = 1.32–15.46) trajectories were associated with retirement. UK participants with high and low ERI were each classified into 3 trajectory classes respectively (no conditions, low-increasing, high-increasing), however no significant associations with retirement were observed.

Conclusion Our findings demonstrate country differences in mean ERI scores and trajectories of multimorbidities and their association with retirement. Trajectories with high intercepts indicating multimorbidity (i.e. 2+ chronic conditions at baseline) were associated with retirement in U.S. older adults only, regardless of ERI. These results imply that baseline multimorbidity status may play a more important role than ERI on retirement in those approaching the retirement age, however further research is required. Socio-economic inequalities and social policies may provide partial explanations for these findings. Public health and workplace interventions may be warranted for workers with multimorbidities.