

on the practical implications of disinvestment initiatives and identify any incentives/disincentives for future developments.

**OP24** **ASSESSING THE COST-EFFECTIVENESS OF ALTERNATIVE CARE PATHWAYS: A CASE STUDY EVALUATING EARLY TRANSFER TO NEUROSCIENCE CENTRES FOR CRITICALLY ILL PATIENTS WITH ACUTE TRAUMATIC BRAIN INJURY**

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**Background** Acute traumatic brain injury (TBI) is a major cause of death, disability and cost. For critically-ill adult TBI patients who present outside a neuroscience centre, and do not require neurosurgery, there is little evidence on whether early transfer to a neuroscience centre is worthwhile. NICE guidelines list the issue as a key research topic. We aimed to assess the relative cost-effectiveness of 'early transfer' (within 18 hours of hospital presentation) versus 'no or late transfer' (after 24 hours) for these patients.

**Methods** The Risk Adjustment In Neurocritical care (RAIN) Study validated risk prediction models following TBI. The RAIN Study recruited admissions following acute TBI to 67 adult critical care units during 2009–11. Detailed information was collected on baseline prognostic factors, the time of transfer to neuroscience centres, and mortality. Resource use data were recorded for six months, and combined with unit costs to report total hospital and community health service costs. At the six month follow-up, data were collected on health-related quality of life (HRQoL), by the EQ-5D-3L. The lifetime cost-effectiveness analysis extrapolated from six month endpoints, informed by the literature. We report lifetime incremental cost per QALY of 'early' versus 'no or late transfer', overall and for subgroups (age  $\leq 70$ , vs  $>70$ ; mild/moderate, vs severe TBI; major extracranial injury, vs none). To adjust for baseline differences we used the previously validated risk prediction models in regression analyses. In sensitivity analyses we considered alternative approaches for extrapolating from the six month endpoints and undertaking risk adjustment.

**Results** There were 584 patients in the 'early' and 263 in the 'no or late transfer' group. After risk adjustment, early transfer was associated, at six months, with lower mortality (odds ratio 0.52, 95% CI 0.34 to 0.80), higher HRQoL for survivors (mean gain 0.13, 0.032 to 0.225), but positive incremental costs (£15,000, £11,123 to £18,880). The lifetime cost per QALY for 'early transfer' was £11,000. For patients older than 70, 'early transfer' was associated with higher mortality, and was unlikely to be cost-effective (probability 0.15 at £20,000 per QALY). For other subgroups, the corresponding probabilities that 'early transfer' is cost-effective were between 0.7 and 1.

**Conclusion** For critically-ill patients with acute TBI aged 70 or less, early transfer to a neuroscience centre appears cost-effective. While this finding is robust to alternative methodological assumptions and choice of risk prediction model, further research is required to investigate the potential impact of unobserved confounding.

Thursday, 13 September 2012

Parallel Session B

Diet and Obesity

**OP25** **USING LINEAR SPLINE MULTILEVEL MODELS TO ASSESS SOCIOECONOMIC DIFFERENCES IN TRAJECTORIES OF DIET, PHYSICAL ACTIVITY AND FAT MASS ACROSS CHILDHOOD**

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**Background** Lower socioeconomic position (SEP) is a risk factor for obesity in children and adolescents in high-income countries. Since diet and physical activity are the main drivers of obesity, the socioeconomic differential in obesity is likely to arise through SEP differences in one or both of these.

**Methods** We explored SEP differences in trajectories of fat mass, energy intake and physical activity (PA) across childhood and early adolescence, using maternal education as a measure of SEP, in the Avon Longitudinal Study of Parents and Children. Fat mass was measured by DXA scans at mean ages 10, 12, 14, 15 years. Energy intake was assessed using food frequency questionnaires (FFQs) at 3, 4.5, 7, 8.5 years and 3-day diet diaries at 3.5, 5, 7.5, 10, 13 years. PA was assessed by accelerometers worn for 7 days at 12, 14, 16 years, used to calculate mean total counts per minute (CPM) and mean minutes of moderate to vigorous PA (MVPA). Energy intake (adjusted for FFQ vs diary), % fat mass, CPM and MVPA were all modelled using linear spline multilevel models.

**Results** 5739 individuals had data on maternal education and at least one measure for each of fat mass, energy intake and PA. The sons of women educated to degree level (highest maternal education category) had consistently lower % fat mass across childhood and early adolescence, but differences between the 3 lower SEP categories only began to emerge from age 14. In females there was a stepwise increase in percent fat mass for each decreasing category of maternal education, and the SEP gradient remained largely stable between 10 and 15 years. The SEP patterning in trajectories of energy intake and PA (CPM and MVPA) did not resemble the SEP patterning in trajectories of fat mass. For energy intake, no SEP differences were observed. For PA in males, there was little SEP patterning in MVPA, but for CPM there were higher levels of activity in lower maternal education groups, i.e. the reverse of the fat mass gradient. For females, CPM and MVPA were both higher in the highest maternal education category, but contrary to the fat mass trajectories, differences between the lower three SEP categories were not consistent.

**Conclusion** Socioeconomic differences in trajectories of energy intake and PA do not resemble the patterns observed for fat mass. Potential explanations for this finding, including measurement error, will be discussed.

**OP26** **BY-STATE COMPARISON OF OBESITY TRENDS IN THE ADULT POPULATION OF THE UNITED STATES OF AMERICA**

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**Background** Excess bodyweight is associated with negative effects on longevity, disability-free life-years, quality-of-life, and productivity. High prevalence of obesity and over-weight is often related to socioeconomic status, educational attainment, and ethnic group. The combination of rising obesity prevalence and increased spending on obese people has been estimated to account for 27% of the growth in US health-care expenditure between 1987 and 2001.

**Methods** The Behavioral Risk Factor Surveillance System (BRFSS) is the world's largest, telephone health survey system, collecting cross-sectional data on health conditions and risk factors in all states of the US yearly since 1984. Telephone interviews provide a cheap alternative to physical examinations and are often used as a way to increase the number of participants in observational studies. Data for 3,814,344 adults from BRFSS were used to investigate trends of obesity levels in each US state. Over the period 1999–2010, the

yearly trend in the percentage of the population with body mass index (BMI) in normal-weight (BMI<25), over-weight (BMI 25–29.9), and obese (BMI>30) ranges, is modelled using multinomial logistic regression, stratifying by gender and age group (20–39, 40–59, >60 years). The fitted models are used to compare trends between states and to forecast levels of obesity in the future. A previously developed micro-simulation model is used to assess the burden of 13 diseases caused by obesity and estimate the economic impact implied by the forecasted trends. Data of the US–National Health and Nutrition Examination Survey collected over the same period are used to investigate the extent of self-reporting bias in BRFSS.

**Results** In 2010, the proportion of obese (BMI>30) men and women in the US was 33% and 35%, respectively, whilst the proportions of over-weight (BMI 25–30) were 42% and 34%. The fitted models forecast an increase in the proportion of obese individuals to up to 70% by 2030. The results reveal increasing levels of obesity in all states, although the rate of increase varies among states. Comparing BRFSS data with data from NHANES, showed that at all ages both men and women slightly over-report their height, whilst women under-report their weight by 5kg on average. Under-reporting of weight is reduced after age 65.

**Conclusion** Obesity rates are rapidly and steadily increasing in the US posing a threat to population health and a substantial economic burden. As self-reporting bias may significantly underestimate BMI in women, the estimated burden of obesity may be conservative.

#### OP27 DIETARY FIBRE INTAKE AND FATAL STROKE RISK IN THE UK WOMEN'S COHORT STUDY

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**Background** In the UK in 2008, stroke was responsible for over 43,000 deaths. Dietary fibre intake may reduce stroke risk through modifying one or more risk factor such as body weight, blood cholesterol, or blood pressure. Food sources of fibre can be examined in relation to risk as different foods contain different types of fibre which have differing proposed actions within the body.

**Methods** 31,036 women recruited in 1995 provided dietary information relating to the previous 12 months using a 217-item food frequency questionnaire. Total dietary fibre intakes were estimated as both non-starch polysaccharide (NSP) and Association of Official Analytical Chemist (AOAC) values. Insoluble fibre, soluble fibre and fibre (NSP) from a variety of food sources were also examined. Stroke mortality was registered from baseline through the Office of National Statistics. Cox proportional hazard ratios were generated to explore risk using both categorical (fifths of intake) and continuous exposure variables. Model adjustments: age, body mass index, energy intake, ethanol, physical activity, smoking and socio-economic status.

**Results** After 14 years, 130 fatal stroke cases were observed. Fatal stroke risk was similar for total fibre assessed either as NSP or AOAC and both were protectively associated with risk. Overall, risk was roughly halved in each intake category compared to the lowest although this was only significant in the 3rd (NSP/AOAC) and 4th (AOAC) category. Those consuming 24 vs. 14g/d of NSP or 37 vs. 22g/d AOAC had their risk of stroke halved [Englyst: hazard ratio 0.47 (95% confidence interval 0.24, 0.92) p=0.028] [AOAC: 0.47 (0.25, 0.89) p=0.021]. For fibre from nuts and seeds, the highest intake category (0.85g/d) saw a 56% risk reduction [0.44 (0.23, 0.83), p=0.012] compared to the lowest (0g/d). Fibre from fruit was also protectively associated with risk of stroke in the 4th (5.8g/d) vs. 1st category (1.4g/d) [0.50 (0.25, 0.97), p=0.041]. These significant associations were not seen in every category comparison and results for continuous exposures were not statistically significant for any of the exposures explored. No association was observed with fibre from cereals, vegetables or legumes.

**Conclusion** Results suggest that fibre from certain food sources and not others may be more beneficial for prevention of stroke. This may occur because different foods contain fibre fractions in varying quantities. Non-significant results for the continuous exposures suggest associations may be non-linear. The results may also reflect benefits simply from 'fruit' or 'nut and seed' consumption rather than specifically fibre from these sources.

#### OP28 DIET QUALITY AND BLOOD PRESSURE IN MIDDLE-AGED MEN AND WOMEN

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**Background** Findings from both observational and experimental studies (including the DASH Trial -Dietary Approaches to Stop Hypertension) are consistent with a significant, causal role for dietary salt intake in the distribution of blood pressure (BP) in populations. The DASH diet quality score, based on the intervention arm in the DASH-trial, has emerged as a potentially useful measure of diet quality in adult populations. We have studied associations between DASH score and blood pressure, both clinic and 24 hour ambulatory measurements (ABPM) in middle-aged men and women.

**Methods** We used cross-sectional data from two studies of men and women aged 50 to 69 years, recruited in 1998 (n=1018) and 2010 (n=2047). Participants completed a physical examination including three standardised clinical BP recordings and a general health and lifestyle questionnaire. A sub-sample (n=1189) in 2010 had 24hr ambulatory BP measurements (ABPM). Diet quality was assessed using a DASH score constructed from a standardised Willett FFQ. DASH scores were categorised into quintiles, with lower quintiles indicating less healthy diets. Hypertension was defined as clinic BP>140/90mmHg (mean of readings 2 and 3) and 24-hour ABPM >130/70mmHg.

**Results** Clear inverse trends were seen between DASH scores and systolic (SBP) and diastolic (DBP) BP in clinic and ABPM recordings. The associations between DASH score and clinic BP were similar in the 1998 and 2010 datasets. In the 2010 data, clinic SBP increased by 7.5 mmHg in men and 5.1 mmHg in women between the highest and lowest DASH quintiles and 24-hour ABPM systolic BP increased by 6.3mmHg and 5.4mmHg in men and women respectively between the highest and lowest DASH quintiles. In fully adjusted analyses, the odds ratios (OR) for clinic hypertension and ABPM hypertension in participants with DASH score in the first relative to the fifth DASH score quintile were as follows: clinic hypertension: OR 1.60 (95% CI 0.9–2.8), ABPM hypertension: OR 4.2; 95 % CI [1.1–15.9]). Stratifying by gender, these trends persisted for men however they were attenuated for women.

**Conclusion** This study provides evidence of criterion validity for the use of DASH score as a measure of diet quality, especially in the diet-hypertension relationship in men. Our findings are consistent with the hypothesis that dietary patterns exert effects beyond the sum of the component parts. Public policy promoting a DASH-style healthy diet could have a significant impact on population health by reducing average blood pressure in the population.

## Socioeconomic Inequalities II

#### OP29 ETHNIC AND SOCIOECONOMIC INFLUENCES ON CHILDHOOD BLOOD PRESSURE: THE CHILD HEART AND HEALTH STUDY IN ENGLAND (CHASE)

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