Abstracts

Plenary sessions

TEMPERATURE AROUND THE TIME OF BIRTH AND CORONARY HEART DISEASE: FINDINGS FROM THE BRITISH WOMEN'S HEART AND HEALTH STUDY

D. A. Lawlor[1], G. Davey Smith[1], R. Mitchell[2], S. Ebrahim[1]. [1]*Department of Social Medicine, University of Bristol, UK;* [2]*Research Unit in Health, Behaviour & Change, University of Edinburgh, UK*

Background: All cause and cardiovascular disease mortality are patterned by season of birth. Plausible explanations for the association included seasonal availability of food during fetal and infant growth, exposure to seasonal infections, and exposure to cold temperatures in early life, all of which may programme changes in adiposity, metabolism, or hormonal pathways. The aim of this study was to examine the role of temperature exposure around the time of birth in these associations.

Design: Cross sectional study. Mean outdoor temperature during the month of birth were estimated using data from the Climatic Research Unit of the University of East Anglia.

Setting: 23 British towns.

Participants: 4286 women aged 60–79 years.

Main Outcome Measure: Coronary heart disease (CHD).

Results: CHD prevalence was greatest among women born during the coldest months: age adjusted odds ratio (95% confidence interval) comparing women born in the coldest quarter of monthly outdoor temperatures to the remaining three quarters was 1.24 (1.03, 1.50). Cold outdoor temperature at birth was also associated with increased insulin resistance, increased triglyceride levels, and a tendency to central obesity. With adjustment for all potential confounding and explanatory factors the association between cold outdoor temperatures around the time of birth and CHD was attenuated to 1.18 (0.94, 1.48). The association between outdoor temperature at birth and increased CHD prevalence was most pronounced among those from lower childhood socioeconomic positions: fully adjusted odds ratio among women whose fathers were in non-manual occupations, 1.01 (0.55, 1.84); in manual occupations, 1.16 (0.89, 1.51); and unemployed, 1.83 (1.09, 3.13). Women born in the winter had increased CHD prevalence but this association attenuated to the null with adjustment for temperature around the time of birth. The association between temperature around the time of birth and CHD was not influenced by adjustment for birth weight. Temperature during the first and second trimesters were not associated with CHD, but temperature during the third trimester had similar patterns to those around the time of birth.

Conclusions: Cold temperature around the time of birth is associated with increased risk of CHD in later life. This work illustrates how a natural phenomenon (climate) can interact with socioeconomic inequalities to increase CHD risk.

ROAD TRAFFIC CRASHES AT MOBILE SPEED CAMERA SITES: A CONTROLLED BEFORE AND AFTER STUDY

S. Christie[1], R. Lyons[2], F. Dunstan[3], S. Jones[3]. [1]*National Public Health Service for Wales, Pontypool, Wales;* [2]*University of Wales Swansea, Swansea* [3]*University of Wales College of Medicine, Cardiff, Wales*

Objective: To investigate the effectiveness of mobile speed cameras in preventing road traffic crashes near camera sites.

Design: Controlled before and after study.

Setting: South Wales.

Data Source: Road traffic crashes involving personal injury attended by police in 1996–2000.

Methods: We used circles and routes methods for defining the local footprint of exposure, with radiuses or distances of 100, 300, 500, and 1000 metres from camera sites, and with strata of time after camera deployment, time of day, posted speed limit, and type of road user injured. We compared observed and expected numbers of crashes after cameras were first deployed at 101 intervention sites and at 101 control sites matched for crash history, posted speed limit, and road class.

Results: Crashes decreased 73% (rate ratio (RR) 0.27, 95% CI 0.19 to 0.39) within 100 m radius of sites; the decrease was only 11% (RR 0.89, 95% CI 0.85 to 0.94) when the radius was increased to 1000 m. At large radiuses the lines method revealed greater decreases than the circles method. Significant decreases in crashes occurred during daytime, on 30 miles per hour roads, and for crashes involving pedestrians and car occupant casualties.

Conclusion: Mobile speed cameras substantially reduce road traffic crashes but their effectiveness varies by small area geography and by type of crash; these dimensions need to be considered in any evaluation of local effectiveness.

IMPLICATIONS OF CURRENT DATA PROTECTION LEGISLATION FOR POPULATION HEALTH RESEARCH: A CASE STUDY

T.M. Farragher[1], P. Warner[2]. [1]*Division of Community Health Sciences,* [2]*University of Edinburgh, Edinburgh, UK*

Background and Setting: Increasing concerns regarding male reproductive health (semen quality), led to a government call for research proposals, in particular for population research. The Scottish Male Reproductive Health Study (SMRHS) was awarded funding. However, between proposal and study launch, new data confidentiality legislation (Data Protection Act 1998 and Caldicott Recommendations) came into force, with consequences for execution of the study.

Objectives of Presentation: Using the SMRHS as a case study, the impact of the current data protection legislation on population health research will be discussed. We will report how the research design had to be adapted to accommodate the new constraints, and the resource consequences. We will consider the implications for study design of future population research, within the current legislation.

Results and Outcomes: The protocol adaptations had epidemiological implications: to contact the study population, sample birth records and NHS data had to be used, so invitations had to be sent via GPs, this resulted in high attrition in the number of invitations reaching possible participants, affecting the power of the study and risking introduction of biases; and reminders to men who failed to respond were not permitted, limiting the researchers' ability to maximise response rate. Directly and indirectly the legislation had resource consequences: the poor response rate had to be compensated for by a second mail out, increasing the sample to 29 000 men contacted via 3700 GPs, at considerable extra "cost", including time; the time needed to produce study materials (letters, questionnaires, for multi-stage contacts with participants) was increased by the requirement that they be approved by MREC/LRECs, the gatekeepers of NHS and birth data, and Directors of Public Health; and the mailing out of invitations had to be undertaken from within the NHS gatekeeper premises, requiring the development of a number of complex databases and additional study staffing. In addition, to comply with new safety legislation regarding the mailing of biological samples (semen) that were to be provided by participants across Scotland, the procedures for the collection of samples had to be revised, which had resource and epidemiological consequences.

Discussion and Conclusions: Currently development of population research protocols is made more difficult by the reluctance of various gatekeepers to give assurance that a particular strategy will or will not be approved. The prevailing uncertainty regarding interpretation of data protection legislation needs to be resolved. Furthermore, the legislation has considerable resource implications for researchers and indirectly for funders. Classic epidemiological population research may no longer be feasible. Other study approaches will be considered.

CORONARY RISK ASSESSMENT: FRAMINGHAM BASED METHODS OVERESTIMATE RISK IN BRITISH MEN

P.M. Brindle[1], J.R. Emberson[2], F.C. Lampe[2], M. Walker[2], P.H. Whincup[3], T Fahey[4], S. Ebrahim[1]. [1]*Department of Social Medicine, University of Bristol, Canygne Hall, Whiteladies Road, Bristol, UK;* [2]*Department of Primary Care and Population Sciences, Royal Free and University College Medical School, London, UK;* [3]*Department of Public Health Sciences, St George's Hospital Medical School, London, UK;* [4]*Tayside Centre for General Practice, Kirsty Semple Way, University of Dundee, Dundee, UK*

Objective: Although the risk score equations from the Framingham study are widely recommended, their validity in the British population is unclear. We aimed to establish the predictive accuracy of the Framingham coronary heart disease (CHD) risk score in a representative British population.

Setting: Twenty four British towns.

Participants: 6643 British men aged 40–59 years and free from cardiovascular disease at entry into the British Regional Heart Study.

Main Outcome Measures: Comparison of observed (a) 10 year CHD mortality; and (b) 10 year CHD mortality and morbidity with CHD rates predicted for each individual by the relevant Framingham risk equation.

Results: Of 6643 men, 2.8% (95% CI 2.4 to 3.2) died from CHD compared with 4.1% predicted (relative overestimation 47%, p <0.0001). A major CHD event (fatal or non-fatal) occurred in 10.2% (95% CI 9.5 to 10.9) of the men compared with 16.0% predicted (relative overestimation 57%, p <0.0001). These relative degrees of overestimation were similar at all levels of CHD risk, so that overestimation of absolute risk was greatest for individuals at highest risk. A simple adjustment provided an improved level of accuracy. When the 10 year predicted CHD event risk of 30% or more was used as a screening test to identify "high" and "low" risk individuals, 84% of subsequent reports of CHD deaths and non-fatal events occurred in those low risk.

Conclusion: Guidelines for the primary prevention of CHD advocate offering preventive measures to individuals at high risk. Most risk assessment methods rely upon equations derived from the Framingham study. Currently recommended risk scoring methods significantly overestimate the absolute coronary risk assigned to individuals in the UK. This will affect the costs associated with the prescribing, monitoring and dealing with the side effects of preventative treatment and will undermine patients' ability to make informed choices about starting potentially lifelong therapy.

DOES DTP, MMR, OR BCG VACCINATION IN EARLY LIFE INFLUENCE THE RISK OF HAY FEVER?

S.A. Bremner[1], I.M. Carey[1], S. De Wilde[1], N. Richards[2], S.R. Hilton[1], D.P. Strachan[1], D.G. Cook[1]. [1]*Department of Community Health Sciences, St George's Hospital Medical School, London, UK;* [2]*CompuFile Ltd, Send, Woking, Surrey, UK*

Background and Aim: Immunisation against childhood infectious diseases is a key element of public health policy with widely accepted benefits. However, suggestions that immunisation may influence the risk of allergic disease, either positively (pertussis) or negatively (BCG) would have widespread effects. Our aim was to determine whether DTP, MMR, and BCG vaccination in early life influenced subsequent hay fever risk.

Methods: A case-control study was nested within a cohort of 116 493 children born between 1989 and 1997, identified within two large general practice databases (GPRD and DIN). These children were continuously registered from birth to at least age 5 years. 7098 hay fever cases were diagnosed after age 2 years. One control per case was matched for practice, birth month, sex, and still being registered on case diagnosis date. Odds ratios (OR) were based on conditional logistic regression models (allowing for the confounding effects of consultation frequency and possible ghosts among controls). Children immunised "on time" were the reference group for DTP and MMR; the unimmunised were the reference group for BCG.

Results: For DTP those unvaccinated (4.3% of children) had an OR of 0.94 (95% CI 0.73 to 1.22) compared with those fully vaccinated in month 5 (39.3% of children). However, those who delayed completion to after 12 months had a reduced OR of 0.60 (0.46 to 0.76). Those never vaccinated with MMR (2.3% of children) had an OR of 0.79 (0.58 to 1.08) compared with those vaccinated in month 14 (29.5% of children). Completion of MMR after 2 years was associated with a reduced risk of hay fever, OR of 0.62 (0.48 to 0.80). The effects of late immunisation with DTP and MMR were independent of each other. However, there was clear evidence from one data set (DIN) that children immunised late were more likely to be from a deprived background. Contrary to expectations, those vaccinated with BCG by age 2 (2.4% of children) were at increased risk of hay fever (OR of 1.33 (1.03 to 1.71)).

Conclusions: Children immunised against DTP or MMR are at no greater risk of hay fever than those not immunised. The apparent protective effect of late immunisation is not specific to either vaccine and it is highly likely that selection bias, related to who is immunised late, explain these weak effects. Selection may also explain the small increased risk of hay fever associated with BCG. Importantly, the evidence does not support the hypothesised protective effect from BCG.

MONKEY BUSINESS: WHAT DO PRIMATE STUDIES OF SOCIAL HIERARCHIES, STRESS, AND THE DEVELOPMENT OF CHD TELL US ABOUT HUMANS?

M Petticrew[1], G. Davey Smith[2]. [1]*MRC Social and Public Health Sciences Unit, University of Glasgow, UK;* [2]*Department of Social Medicine, University of Bristol, UK*

Introduction: The view that the health effects of inequality are manifested through psychosocial mechanisms is widely promoted, and primate models of this relationship (for example, studies of the link between social status and CHD) have been used as support for the plausibility of claims that social status has effects on CHD risk in the absence of material differences within human societies. However, it has been suggested by primatologists and others that this expanded view of hierarchy and dominance has been over interpreted by researchers studying social inequalities in health.

Methods: We reviewed the primate studies that have explored the relationship between either social status (dominance/subordination) or social stress, and CHD. We then carried out a citation analysis of these studies to explore how this evidence is used in the health inequalities debate.

Results: We found 13 studies, three of which were experimental. These suggest that if there is an association between status and CHD, and this is far from clear, that it may be mediated by sex. There is little evidence from the studies of induced stress to suggest a consistent relationship with CHD. Citations within the psychosocial epidemiology field are highly selective, resulting in the misleading impression that primate studies support the plausibility of direct psychosocial influences on CHD risk.

Conclusions: Studies on social status in primates appear to suggest that if anything the relationships between social status and CHD are sex specific, and in particular that subordinate status is not a blanket predictor of atherosclerosis. Indeed, in male monkeys dominant, not subordinate, status may be pathological. As regards social stress, there are probably too little data to come to any firm conclusions. At a purely methodological level, the primate data do not support major public health claims.

HSR I

FACTORS INFLUENCING TIME TO TREATMENT FOR PATIENTS WITH BREAST OR COLORECTAL CANCER

R. Robertson[2], N. Campbell[1], S. Smith[1], P. Donnan[3], F. Sullivan[3], R. Duffy[3], L. Ritchie[1]. [1]*General Practice and Primary Care, University of Aberdeen, UK;* [2]*Community Health Sciences, University of Edinburgh, UK;* [3]*Tayside Centre for General Practice, University of Dundee, UK*

Objectives: To determine if time between first presentation in general practice and specialist treatment is longer for colorectal and breast cancer patients who live further from cancer centres, and what patient, general practice, or secondary care factors are associated with time to treatment.

Design: Historical cohort study by review of general practitioner (GP) records.

Setting and Participants: Patients from Grampian, Tayside, and Highland Health Board areas diagnosed with colorectal or breast cancer between January 1997 and December 1998.

Main Outcome Measures: Time from first presentation with suspicious symptoms to first treatment.

Results: GP medical records were reviewed for 2320 (82.4%) of the 2815 eligible cases. Times to treatment were no longer for rural patients. Breast cancer cases were more likely to be treated quickly if they had a breast lump (RR=3.20, 95% CI 1.51 to 6.80, p=0.003), a change in skin contour (RR=1.73, 95% CI 1.04 to 2.88, p=0.04), or

lymphadenopathy (RR=2.05, 95% CI 1.06 to 3.99, p=0.03). Increasing age and more symptoms were also associated with quicker treatment. Treatment was faster for patients referred to general (RR=4.18, 95% CI 2.15 to 8.13, p <0.001) and community hospitals (RR=2.83 95% CI 1.43 to 5.58, p <0.001) than for those referred to cancer centres. Colorectal cancer patients were more likely to be treated quickly if they had a palpable rectal mass (RR=8.94, 95% CI 2.48 to 32.13, p <0.001), an abdominal mass (RR=4.32, 95% CI 1.95 to 9.59, p <0.001), tenesmus (RR=2.69, 95% CI 1.02 to 7.09, p=0.046), or abdominal pain (RR=1.51, 95% CI 1.06 to 2.14, p=0.023). People with a history of anxiety or depression were less likely to be treated within 90 days (RR=0.47, 95% CI 0.28 to 0.77, p <0.001).

Conclusions: Provider delay does not explain why rural patients have been found to have more advanced disease at diagnosis. More research is needed to study the time taken by patients to consult with symptoms that turn out to be cancer. The strongest associations with time to treatment were clinical factors. Time to treatment for colorectal cancer was longer for patients with a past history of anxiety or depression, which may reflect difficulty diagnosing gastrointestinal symptoms in this context. Hospital of referral was an important factor in breast cancer—treatment took longest for patients referred to cancer centres, which may reflect their acknowledged resource problems.

BARRIERS TO THE UPTAKE OF CATARACT SURGICAL SERVICES IN BANGLADESH

B.P. Dineen[1], R.R.A. Bourne[1,2], S.M. Ali[3], D.M. Noorul Huq[3], G.J. Johnson[1]. *[1]Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK; [2]Institute of Ophthalmology, UCL, London, UK; [3]National Institute of Ophthalmology, Dhaka, Bangladesh*

Purpose: To identify the barriers to the uptake of cataract surgical services among Bangladeshi adults with visually impairing cataract.

Methods: A nationally representative sample of 12 782 adults 30 years of age and older was selected based on multistage, cluster random sampling with "probability proportional to size" procedures. A comprehensive eye examination was undertaken on all subjects, with additional testing for persons with visual impairment. The World Health Organization/Prevention of Blindness proforma and its classification system for identifying the main cause of blindness (<3/60 visual acuity) and low vision (<6/12 to ⩾3/60 visual acuity) were used in this population based research study. All subjects found to have visually impairing cataract(s) were asked to indicate the main reason for not having sought eye care for their vision problem.

Results: Of the 11 624 subjects who were examined, 2518 had visual impairment less than 6/12 in either one or both eyes. The principal cause of blindness and of lesser degrees of visual impairment was cataract. This singular condition was identified as the main cause (79.63%) of the 162 cases of bilateral blindness. In total, there were 1305 subjects with visually impairing cataract for whom the main reason of not having accessed eye care services was identified. The main barriers to treatment uptake include: poverty (48.6%); subjects not knowing that they had cataract (12.7%); subjects indicated that they felt their vision was "adequate" (7.0%); not being interested in undergoing surgery (7.0%); no accompanying person (6.1%); fear of surgery (4.8%); and lack of time (3.4%).

Conclusions: Cataract is the major cause of treatable blindness and visual impairment in the world, with cataract surgery being an effective means of restoring sight. Lack of eye care service uptake in Bangladesh is associated with several socioeconomic and cultural factors that should be considered in order to improve eye care delivery. Several barriers to the uptake of cataract surgical services have been identified, principal among these being the lack of money to pay for surgery. Additionally, the lack of awareness of having cataract(s) highlights the lack of information existent within the population as to the nature of the disease and its treatment.

EFFECTIVENESS OF INFLUENZA VACCINE AGAINST RESPIRATORY HOSPITALISATIONS AND DEATHS IN 65 YEAR OLDS AND OLDER: A COHORT STUDY USING THE UNITED KINGDOM GENERAL PRACTICE RESEARCH DATABASE

P. Mangtani[1], P. Cumberland[2], C. Hodgson[3], J. Roberts[1], F. Cutts[4], A. J. Hall[1]. *[1]London School of Hygiene and Tropical Medicine, London, UK; [2]Institute of Child Health, London, UK; [3]Office for National Statistics, London, UK; [4]MRC Laboratories, PO Box 273, The Gambia*

Objectives: To estimate effectiveness of influenza vaccination against respiratory diseases causing hospitalisation and death in people aged over 64 years.

Design: Historical cohort study.

Setting: Primary care patients in practices contributing to the General Practice Research Database in England and Wales from 1989 to 1999 inclusive.

Participants: Patients registered with general practices for at least 1 year prior to 1 September each year. Influenza vaccination status each year was noted from practice records. A total of 692 819 vaccinated and 1 534 280 unvaccinated patient years accrued over the 10 years.

Main Outcome Measures: Rates of admissions for acute respiratory diseases and respiratory deaths in vaccine compared to non-vaccine recipients.

Results: Vaccine effectiveness against acute respiratory hospitalisations averaged 21% (95% CI 17% to 26%) with a rate reduction attributable to vaccination of 4.15 per 100 000 person weeks when influenza is circulating. No important reduction in admissions in those vaccinated was seen outside the influenza seasons. Influenza vaccine effectiveness against respiratory disease deaths averaged 12% (95% CI 8% to 16%). The vaccine appeared to cause a greater proportionate reduction in people without underlying medical disorders, but the absolute reduction was higher in those with medical disorders (6.14 compared with 3.12 per 100 000 weeks when influenza circulating).

Conclusions: The purpose of influenza vaccination is the prevention of illness, hospitalisation, and death. The effectiveness of a yearly influenza vaccine in the UK population aged at least 65 years, averaged over a number of epidemic and non-epidemic years, strengthens the evidence for an untargeted adult influenza vaccination programme that requires yearly vaccination.

UNMENTIONABLE MALADIES: WHAT ARE THE CONSEQUENCES FOR SELF CARE AND SOCIAL SUPPORT?

M. Santer[1], P. Warner[2], S. Wyke[3]. *[1]Community Health Sciences-General Practice, Edinburgh, UK; [2]Community Health Sciences-Public Health, Edinburgh, UK; [3]Scottish School of Primary Care, Edinburgh, UK*

Background: In many societies including Britain there is a strong cultural etiquette against discussion of menstruation. Heavy menstrual bleeding is commonly experienced yet a relatively small proportion of women consult health professionals with their symptoms. This may be because symptoms are effectively managed through self care and informal advice and support, or it may mean that there are many women whose everyday activities are compromised.

Aims: To investigate what forms of self care are used to manage heavy menstrual bleeding and related menstrual co-morbidity and the extent of informal sources of advice.

Design: Semi-structured qualitative interviews with women aged 27–45 who reported heavy menstrual bleeding in a community survey and had agreed to be contacted for interview.

Methods: Women were sampled in relation to whether they reported periods as a problem, experience of pain, and whether they had consulted a GP about periods. Thirty two were interviewed. Interviews were taped and transcribed. Analysis was carried out using a constant comparative approach. Themes were identified from transcripts and existing literature in order to develop an analytic framework, which was then used to index transcripts and to aid comparison between them.

Findings: A wide range of self care practices were being utilised for heavy menstrual bleeding, including: self medication (many women had associated pain); non-medication self treatment (eg extensive use of sanitary and other products to contain bleeding); and resting and planning ahead to adjust activities during periods (eg altering work commitments). Many women held firm views about possible causes of symptoms and potential investigations or treatments as a result of speaking to others in a social network. Informal discussions were a source of advice, reassurance, and practical support for many women. However, some felt unable to speak to family or friends about periods or, at least, not about heaviness of blood loss. This concealment led to a lack of information and difficulties in managing heavy menstrual bleeding, for instance in the work place.

Conclusions: Many women access reassurance, advice, and practical support for heavy menstrual bleeding by informal discussion within the social network. Healthcare practitioners need to be aware of this information source when advising women. However, heaviness of loss was more difficult to discuss than other menstrual symptoms and some women were reluctant to discuss periods with others at all. Strategies to reduce cultural constraints on discussion of menstrual problems, at all levels, might help more women to access support for heavy menstrual bleeding.

Inequality I

REVISITING THE HEALTH SELECTION HYPOTHESIS USING STRUCTURAL EQUATION MODELS

T. Chandola[1], M. Wadsworth[1], M. Marmot[1]. [1]*International Centre for Health and Society, Department of Epidemiology and Public Health, University College London, UK*

Introduction: There has been considerable debate over the importance of the health selection hypothesis for explaining social gradients in health. Although studies have argued that it may not be an important explanation of social gradients in health, this contradicts other research that shows evidence for health related social mobility. The reason for this apparent puzzle may be a lack of analyses that estimate, simultaneously, the relative effect of health on changes in social position and of social position on changes in health (social causation). Cross lagged longitudinal analyses using structural equation models enable the estimation of the relative size of these pathways that would be useful in determining the relative importance of the health selection hypothesis over the social causation hypothesis.

Methods: Data from the Whitehall II study (over a 10 year period) and from the MRC 1946 Birth Cohort Study (BCS) were analysed to examine whether health related mobility explained changes in social position in terms of both intergenerational and intragenerational social mobility. Health was measured by the GHQ-30, SF-36 questionnaire (Whitehall II), height, BMI, and an index of health problems (1946 BCS). Social position was measured by employment grade, financial problems (Whitehall II), social class, educational level, and household tenure (1946 BCS). Cross lagged longitudinal analyses using structural equation models were used to estimate the relative importance of the health selection hypothesis over the social causation hypothesis.

Results: Although there was some evidence of health related social mobility in both cohorts, there was little evidence that such health related mobility explained changes in social position. Social inequality in health in adulthood does not appear to be primarily explained in terms of a health selection effect. The results suggest that the development of social gradients in health in the Whitehall II study and changes in the social gradients in health from childhood to adulthood in the 1946 Birth Cohort Study may not be primarily explained in terms of a health selection effect.

EVIDENCE FOR THE CONTRIBUTION OF MIGRATION, SOCIAL DEPRIVATION, AND LIFE COURSE PROCESSES TO THE RISE AND FALL OF CHD IN MID 20TH CENTURY USA

C. Kelleher[1], S. Harper[2], J.W. Lynch[2]. [1]*Department of Public Health Medicine and Epidemiology, University College Dublin, UK;* [2]*Center of Social Epidemiology and Population Health, University of Michigan, USA*

Objective: To investigate from a life course perspective how the unprecedented large scale immigration of Europeans into the USA between 1850–1930 might have contributed to the timing and extent of the epidemic pattern of coronary heart disease (CHD) between 1910–1970.

Design: Ecological analysis based on routinely available hard copy and electronic vital and mortality statistics collected through the unique decennial US Federal Census 1850–1970. Nativity by country of origin of all US residents was recorded from 1850 onwards and parentage from 1870–1970. Age specific and age standardised (to year 2000) heart disease mortality from 1904–1932 for US registration areas and from 1933–1998 for entire USA were examined, as well as all census reports and selected studies on the question of white ethnicity and heart disease for the period.

Results: Between 1850 and 1970, the US population expanded from circa 23 million to circa 200 million. Mortality from circulatory diseases rose steadily in early 20th century, peaked in 1950 at 800/100 000 CHD mortality for males aged 35–74 and declined steeply from 1970 onwards. Between 1880 and 1930 foreign born and their first generation children constituted consistently one third of the population. Immigration ceased before world war two and these numbers declined dramatically in relative and absolute terms to around 9% of the population by 1970. Median age of foreign born men and women was highly correlated with the epidemic pattern (r=0.92, r=0.60, each p=0.0001). The percentage of foreign born is also correlated with the epidemic pattern 60 years later (r=0.72, p <0.0001 for men and r=0.52 p <0.0001 for women), suggesting a contribution of their first generation children to the epidemic. The vast majority of immigrants were economically disadvantaged and of white European origin, first from Germany, Ireland, the British Isles, and Nordic countries, and later Southern, Central, and Eastern Europe. Census reports and related monographs from 1850–1970 repeatedly noted excessive mortality in middle age and from circulatory disease of early European immigrants and their first generation offspring. Ethnic variations were noted, with Italians and Jews at lesser risk than others, but immigrants generally were still at higher risk than native born Americans with native born parents or compatriots in country of origin.

Conclusions: The timing, composition, and scale of the immigration pattern provide a plausible interpretation for the pattern of the CHD epidemic. This explanation integrates the expected period effects of lifestyle risk factors with more current understanding of the influence of life course and social variation on risk.

TEMPORAL, GEOGRAPHIC, AND SOCIAL DIFFERENCES IN THE INCIDENCE OF 30 COMMON CHILDHOOD CONDITIONS PRESENTING IN PRIMARY CARE

I.M. Carey[1], S. De Wilde[1], S.A. Bremner[1], N. Richards[2], S. Caine[2], S.R. Hilton[1], D.P. Strachan[1], D.G. Cook[1]. [1]*Department of Community Health Sciences, St George's Hospital Medical School, London, UK;* [2]*CompuFile Ltd, Send, Woking, Surrey, UK*

Study Objective: To investigate temporal, social, and geographic differences in the recording of 30 common childhood conditions within primary care during the 1990s.

Design: The Doctors' Independent Network (DIN) Database consists of computerised medical records from UK general practices using the Torex (formerly Meditel) system.

Setting: 142 practices providing "high quality data" to DIN, during the period 1990 to 2002.

Patients: 39 672 children born between 1990 and 1996 inclusive into DIN practices and followed continuously from birth until at least age 5 years.

Measures: Cumulative incidence rates to age 5 for 30 common childhood conditions were derived. A Classification Of Residential Neighbourhoods (ACORN) is a commercial sociodemographic classification of enumeration districts in England and Wales based on 1991 Census data. ACORN scores were linked to an individual based on postcode.

Analysis: Temporal, geographic, and urban/rural differences were analysed by logistic regression with practice as the unit of analysis and allowing for extra binomial variation. Analysis of ACORN scores were based on individual level logistic regressions adjusting for year of birth, sex, and practice.

Results: The cumulative incidence of many conditions fell with successive birth cohorts during the 1990s. Inner city practices tended to have higher rates of hay fever, dermatophytosis, and scabies (odds ratios compared to rural practices >2, p <0.001), but lower rates of laryngitis, chronic otitis media, and rubella (OR <0.5, p <0.001). Region was generally not important, though scabies (OR=2.22) and candidiasis (OR=1.44) were higher in the North (p <0.001). Incidence rates were higher in the lower socioeconomic categories of ACORN for most conditions, with the most marked trends seen for infestations (p <0.001): OR were 3.87 ("Striving" *v* "Thriving") for headlice and 3.37 for scabies. Other conditions, such as asthma (OR=1.38), showed smaller but significant trends with ACORN.

Conclusion: The recording of many common childhood conditions appears to be influenced more by socioeconomic factors and urban rural differences than by geographical ones. The fall in the cumulative incidence of many conditions over successive birth cohorts mirrors small declines seen in overall consultation behaviour for all children under 5 years in DIN in the late 1990s.

ETHNIC DIFFERENCES IN OVERWEIGHT AND OBESE CHILDREN AND YOUNG ADULTS IN ENGLAND

S. Saxena[1], G. Ambler[2], T. Cole[3], A. Majeed[1]. [1]*Primary Care Research Unit, University College London, UK;* [2]*Medical Statistics Unit, UCLH NHS Trust, UK;* [3]*Centre for Paediatric Epidemiology & Biostatistics, Institute of Child Health, London, UK*

Background: The worldwide epidemic rise in obesity in children presents a major potential public health burden of cardiovascular disease. In the US, obesity is rising faster among African–American children. Adult British South Asians and African–Caribbeans are at increased risk of coronary heart disease and stroke, respectively, compared with Europeans. Recent reports suggest that British South Asian children have increased biochemical risk factors for cardiovascular disease. We examined the prevalence of obesity and overweight among children from different ethnic subgroups in the UK.

Objectives: To determine the percentage of children and young adults who are obese or overweight within different ethnic and socio-economic groups.

Design and Methods: We conducted a secondary analysis of cross sectional survey data from the 1999 Health Survey for England. We examined body mass index records in 5689 children and young adults aged 2–20 years for prevalence of overweight and obese girls and boys, as defined by the International Obesity Task Force.

Results: 22% of children (n=1311) were overweight, of whom 6% (n=358) were obese. More girls than boys were overweight (24% *v* 22% respectively, p=0.03). Marked differences were seen between ethnic groups. African–Caribbean girls were more likely to be overweight (OR 1.73, 95% CI 1.29 to 2.33) and African–Caribbean and Pakistani girls were more likely to be obese than girls in the general population (OR 2.74, 95% CI 1.74 to 4.31 and 1.71, 1.06 to 2.76, respectively). Indian and Pakistani boys were more likely to be overweight (OR 1.55, 95% CI 1.12 to 2.17 and 1.36, 1.01 to 1.83, respectively). There were no significant differences in the prevalence of obese and overweight children from different social classes.

Conclusion: The percentage of children and young adults who are obese and overweight differs by ethnic group and sex, but not by social class. British African–Caribbean and Pakistani girls have an increased risk of being obese and Indian and Pakistani boys have an increased risk of being overweight than the general population. These individuals may be at greater combined cumulative risk of morbidity and mortality from cardiovascular disease.

CHD and stroke care

REDUCTIONS IN CARDIAC MORTALITY WITH EXERCISE BASED CARDIAC REHABILITATION: HOW MUCH CAN BE ATTRIBUTED TO IMPROVEMENTS IN CARDIOVASCULAR RISK FACTORS?

R.S. Taylor[1], S. Capewell[2], B. Unal[2], J.A. Critchley[2]. [1]*Department of Public Health & Epidemiology, University of Birmingham, UK;* [2]*Department of Public Health, University of Liverpool, UK*

The National Service Framework for Coronary Heart Disease recognises the need to develop the national provision and uptake of cardiac rehabilitation services. A recent update of a Cochrane systematic review of exercise based rehabilitation found substantial improvements in all cause mortality and cardiac mortality in coronary heart disease patients. Also observed were improvements in primary risk factor (smoking, blood pressure, and serum cholesterol) levels. Exercise training is known to directly stimulate improvements in cardiac function that include reductions in myocardial oxygen demand and a reduced risk of coronary vasospasm. It is also well recognised that mortality risk is reduced in coronary heart disease patients who stop smoking or decrease their cholesterol or blood pressure. Might exercise rehabilitation therefore influence cardiac mortality in coronary heart disease patients both directly (via an impact on cardiac function) and indirectly (via primary major factors)? Using a variety of sources on the England and Wales population, the IMPACT coronary heart disease mortality model was used to address this question. Deaths prevented or postponed, stratified by age, were estimated as the product of three variables: the number of coronary heart disease deaths observed in the control group, the relative reduction in the specific risk factor and the β coefficient (which quantifies the relationship between population change in that specific risk factor and the consequent change in population mortality rate from coronary heart disease). Because of the uncertainties surrounding many of these values, a multi-way sensitivity analysis was performed using the analysis of extremes method. The updated Cochrane review identified a total of 30 randomised controlled trials. We included 14 trials (2984 patients) where exercise was the only intervention. Across these trials, exercise reduced pooled cardiac mortality by 23% (RR 0.77, 95% CI 0.65 to 0.91), with 30 fewer deaths than in the control group. Approximately 17 (57%) of these 30 fewer deaths were attributable to reductions in major cardiovascular risk factors, 4.0 deaths (minimum estimate: −12.3, maximum estimate: 12.1) to a 0.11 mmol/l reduction in cholesterol, 3.7 deaths (min −4.0, max 13.4) to a 2.0 mm Hg reduction in systolic blood pressure and 8.9 deaths (min −5.4, max 17.5) to an 18% reduction in smoking prevalence. We found over half of the 23% reduction in cardiac mortality achieved with exercise based cardiac rehabilitation may well be attributed to reductions in major risk factors, principally smoking and cholesterol. The implications of this finding will be discussed.

A SYSTEMATIC REVIEW OF MULTI-DISCIPLINARY INTERVENTIONS IN HEART FAILURE

J. Battersby[1], R. Holland[2], I. Harvey[2], E. Lenaghan[2], J. Smith, L. Hay[2]. [1]*Institute of Public Health, Cambridge, UK;* [2]*School of Medicine, Health Policy and Practice, University of East Anglia, Norwich, UK*

Background: Heart failure is a common and serious public health problem accounting for 5% of medical admissions. Recent evidence suggests multidisciplinary interventions such as nurse led clinics, education, medication review, and symptom self monitoring have a role to play in the management of heart failure. We performed a systematic review to assess the impact of these interventions on mortality and re-admission of patients with congestive heart failure.

Methods: We searched for randomised controlled trials on the following electronic databases: Medline, CINAHL, Embase, Cochrane Database of Systematic Reviews, DARE, Cochrane Controlled Trials Register, Biomed, Meta-Register of Current Controlled Trials, Research Findings Electronic Register, NHS Research Register, and the TRIP Database. Studies of patients with heart failure due to ischaemic heart disease or cardiomyopathy were included. Studies were excluded where more than 50% of patients suffered right heart failure, or heart failure secondary to other diseases (such as cancer). Multidisciplinary interventions were defined as those in which heart failure management was the responsibility of a multidisciplinary team that included one or more of: a specialist nurse, pharmacist, health educator, dietician, or social worker. Trials of drugs and exercise based interventions were excluded. Primary outcomes were mortality or re-admission to hospital. Meta-analysis (fixed and random effects methods) and funnel plots were performed on key outcomes.

Results: We identified 34 trials that met our inclusion criteria. Fifteen trials included relevant data for inclusion in a meta-analysis. Of these, 11 included mortality data and 11 re-admission data. Overall, home based, as opposed to hospital or clinic based, multidisciplinary interventions reduce both the number of all cause deaths among heart failure patients (OR 0.75, 95% CI 0.58 to 0.97) and the number of patients readmitted to hospital (OR 0.65, 95% CI 0.53 to 0.79).

Conclusion: Multidisciplinary interventions for heart failure appear to have the potential to reduce hospital readmissions. Although this group of interventions had several common components they were not totally homogeneous. However, it would appear that a key factor is delivering these forms of interventions at home.

A FAMILY SUPPORT ORGANISER FOR STROKE PATIENTS AND THEIR CARERS: INTERVENTION DESIGN AND RESULTS OF A RANDOMISED CONTROLLED TRIAL

K. Tilling[1], C. McKevitt[2], C. Coshall[2], K. Daneski[2], C. Wolfe[2]. [1]*Department of Social Medicine, Bristol University, UK;* [2] *Department of Public Health Sciences, King's College London, UK*

Background and Purpose: This randomised controlled trial compares the effect of a family support organiser (FSO) service with usual care in stroke patients in the UK. Trials of similar interventions have been contradictory/inconclusive. We therefore used the MRC Framework Approach to Complex Interventions to refine both the intervention and the outcomes used.

Methods: A survey of existing FSOs was undertaken, and qualitative methods were used to elucidate their views and those of patients and carers about what the FSO service should offer. This informed the job specification and training, and the outcomes used. From 1 March 1999 to 1 April 2001 all first in a lifetime strokes were identified and 340 eligible strokes randomised to FSO or usual care. Patients and their carers were followed up at 3 and 12 months post-stroke. Outcomes included satisfaction with outpatient and social services, use of social services, reintegration to normal living (RNLI), and feelings about life after the stroke.

Results: The mean number of contacts with the FSO was 15 (SD=9.8) per patient. There was little evidence of differences between the two groups in outcomes (eg ADL) that were stroke related but not intervention related. There was also little evidence at 3 or 12 months of differences in RNLI, but some evidence of increased satisfaction with services in the FSO group.

Conclusions: Previous trials have suffered from inadequately defined interventions or inappropriate outcomes. Here, preliminary research defined the role of the FSO and the needs of patients, and these were incorporated into the trial design. Even so, there were few differences in outcome between the FSO and control groups. A meta-analysis of trials in this area is now needed to fully identify any benefits of the FSO role.

FACTORS THAT MAY CONTRIBUTE TO INEQUITY IN STROKE CARE: A QUALITATIVE STUDY

F. Mold, C. McKevitt, C. Wolfe. *Department of Public Health Sciences, King's College London, UK*

Background: Provision of care to stroke patients is known to vary geographically and by sociodemographic and clinical characteristics. Data from the population based South London Stroke Register (SLSR) suggest that provision of rehabilitation therapies and risk factor management after stroke may be associated with factors such as age, ethnicity, or level of disability. Patient characteristics may predict such differences but what drives them?

Objectives: This study investigated processes that may give rise to inequity in the provision of stroke care. We aimed to identify professionals' and patients' perceptions of gaps in service provision, to inform statistical analysis of service use and outcome data from the SLSR.

Methods: Semi-structured interviews were conducted with health and social care providers (medical, nursing, therapy staff, and social care managers/workers) and stroke patients and their carers in three areas of inner city London. Tape recorded interviews were transcribed verbatim, imported, and coded into WinMax Pro (version 6), and thematic content analysis undertaken.

Findings: Several factors hinder professionals' ability to deliver services and patients' ability to access them. Professionals identified structural barriers to rehabilitation services (such as eligibility criteria); organisational difficulties with delivering services across care agencies; inability to meet the needs of patients with complex problems; variations *between* and *within* boroughs in the availability of services (admission to stroke units, community rehabilitation schemes, provision of aids, and adaptations); language and communication problems for patients using stroke services; and professionals' assumptions about the rehabilitation potential of older and younger stroke patients. Lack of information about stroke illness and stroke services, low expectations of care, and communication problems were barriers to patients' uptake of services.

Conclusion: Barriers to service provision for chronic disease such as stroke are structural and cultural. Strategies to improve equitable provision of care will need to address both types of barrier. New knowledge arising from this research indicates that younger patients, those with limited literacy skills and cognition have difficulty in accessing stroke services. Further research is needed to explore these issues.

Policy and decision making

WILL THE PRIVATISATION OF NHS PROVISION UNDERMINE THE PRINCIPLES OF THE NHS?

A. Talbot Smith, A.M. Pollock. *Public Health Policy Unit, School of Public Policy, University College London, UK.*

The UK NHS was established in 1948 as a universal health care system. Although it rapidly became a model maker for many countries around the world, its own history has been one of underinvestment and political neglect. This was followed by a period of unpopular and controversial pro-market reforms during the early 1990s, with the 1997 incoming Labour government making an election pledge to "save the NHS".

Subsequent health policy for England was enshrined within *The NHS plan*, a 10 year programme for reform of the NHS. This made a commitment to raise government expenditure on healthcare and to continue funding of the NHS through central taxation. However, in line with Labour government policies for all public services *The NHS plan* also signalled the continuation of the market oriented reforms to the delivery side of the NHS, with an expanded role for the private sector in the delivery of care.

The drive to increase the role of the private sector in the delivery of healthcare is consistent with an international trend sometimes described as global public private partnerships. It parallels the redefinition of healthcare as a private rather than a public good. However, increased private sector involvement in NHS health care provision requires the creation of new markets and capacity, within both primary and secondary care. It also requires reform of the health care system to enable disinvestments from NHS providers and reinvestment in the independent sector.

This paper describes the process and mechanisms by which this is being achieved from the perspective of the founding principles of the NHS, namely services provided on the basis of universality and equity, free at the point of delivery. It also identifies the elements of reform that may signal an intention to reform the financing of the NHS despite the governments stated commitment, their commitment to a single payer system funded through central taxation.

GUIDELINE DISSEMINATION AND IMPLEMENTATION STRATEGIES: A SYSTEMATIC REVIEW OF EFFECTIVENESS AND EFFICIENCY

J.M. Grimshaw[1], R.E. Thomas[2], G. Maclennan[2], C. Fraser[2], C.R. Ramsay[2], L .Vale[2], P. Whitty[3], M.P. Eccles[4], L. Matowe[5], L. Shirran[2], M .Wensing[6], R. Dijkstra[6]. *[1]Institute of Population Health, University of Ottawa, Canada; [2]Health Services Research Unit, University of Aberdeen, UK; [3]University of Newcastle upon Tyne, UK; [4]Centre for Health Services Research, University of Newcastle upon Tyne, UK; [5]Department of Pharmacy Practice, Kuwait University, Kuwait; [6]Centre for Quality of Care Research, University of Nijmegen, The Netherlands*

Objectives: Clinical guidelines have the potential to improve care by promoting interventions of proven benefit and discouraging ineffective interventions. The aims of this systematic review were to estimate the effectiveness and efficiency of strategies used to disseminate and implement clinical guidelines.

Methods: Rigorous studies were identified through searches of Medline, HEALTHSTAR, EMBASE, SIGLE and the specialised register of the Cochrane Effective Practice, and Organisation of Care group (EPOC) using a strategy developed by EPOC. Two reviewers assessed each report independently for inclusion in the review according to predefined criteria. Two reviewers abstracted data on the methodological quality, study setting, intervention strategies, targeted behaviours, study measures, and any economic evaluations. Single estimates of the size of effect on dichotomous process variables (eg proportion of patients receiving appropriate treatment) were derived for each study comparison. These were based upon the primary endpoint (as defined by the authors of the study) or the median measure across several reported endpoints.

Results: 235 studies reporting 309 comparisons of strategies met the inclusion criteria. The overall methodological quality of the studies was poor. The most common study design was a "cluster" randomised controlled trial (47% (110)). The most common single intervention strategies evaluated were reminders (38 comparisons), dissemination of educational materials (18 comparisons), and audit and feedback (12 comparisons). The majority (73%) of comparisons evaluated combinations of intervention strategies. The majority of comparisons demonstrated small to modest improvements in practice, for example the median absolute improvement in performance across interventions ranged from 13.1% in 13 cluster randomised comparisons of reminders, 8.1% in four cluster randomised comparisons of dissemination of educational materials, 7.0% in five cluster randomised comparisons of audit and feedback, and 6.0% in 13 cluster randomised comparisons of multi-faceted interventions involving educational outreach. There was considerable variation in the effects within and across interventions. Combinations of interventions did not appear to be more effective than single interventions. Only 29% of comparisons reported any economic data.

Conclusions: There is a poor evidence base to support decisions about which strategies are likely to be efficient. Decision makers need to use considerable judgement based upon consideration of the likely benefits and costs required to introduce guidelines and the benefits and costs as a result of any changes in practice.

ESTIMATION OF IMPLIED RATES OF DISCOUNTING IN HEALTH CARE DECISION MAKING

R.R. West[1], R. McNabb[2], A.G.H. Thompson[3], T.A. Sheldon[4], J. Grimley Evans[5]. *[1]University of Wales College of Medicine, UK; [2]University of Wales Cardiff, UK; [3]University of Edinburgh, UK; [4]University of York, UK; [5]University of Oxford, UK*

Background: A standard economic practice in comparison of costs and benefits, which occur at different points in time, is to "discount" future values to "equivalent present values". The rates of discount employed can have profound effects on estimates of present value and on consequent decisions, particularly in healthcare and public health, where programmes with long term outcomes are common. However, the use of discounting in public sector decision making has been questioned on theoretical grounds.

Objective: To study firstly, whether individuals discount society's future and their own futures at different rates, and secondly, whether individuals discount future health and finance differently.

Subjects and Methods: Random samples of adults and health care professionals in South Glamorgan were interviewed, using a

structured interview schedule, to estimate implied rates of discount in four fields: private finance, private health, public finance, and public health. Subjects were asked to compare present and future figures and choose future figures, deemed equivalent to the present figure, in four simple scenarios in each field. Implied rates of discount were calculated from respondents' equivalent values.

Results: There was wide variation in implied discount rates between questions and between subjects (385 adults and 180 health care professionals). Despite variation there was a statistically significant trend of lower discounting for public than for private comparisons and for health than for financial comparisons: medians, private finance 5–12.5%, private health 0–7.7%, public finance 0–9.5%, and public health 0–2.4%. There was some evidence of lower discounting over longer time intervals and larger sums but little association with respondents' age, social class, education, or health status.

Conclusion: These findings support the view that people, both informed health care workers and members of the public generally, discount on behalf of society at a lower rate than they discount for themselves. This has consequences for prioritisation in health care planning.

QUALITY OF CARE FOR ELDERLY ADULTS IN NURSING HOMES AND IN THE COMMUNITY: A CONTROLLED OBSERVATIONAL STUDY

T. Fahey[1], A.A. Montgomery[2], J. Barnes[3], J. Protheroe[4]. [1]*Tayside Centre for General Practice, University of Dundee, UK;* [2]*Division of Primary Health Care, University of Bristol, UK;* [3]*Bradgate Surgery, Bristol, UK;* [4]*National Primary Care Research and Development Centre, University of Manchester, UK*

Objectives: To assess the quality of care given to elderly people and compare the care given to residents in nursing homes with those living in their own homes.

Design: Controlled observational study.

Setting: Primary care, Bristol, UK.

Participants: Elderly individuals (aged ⩾65 years) registered with three general practices, of whom 172 were residents in nursing homes (cases) and 526 lived at home (matched controls).

Outcome Measures: The quality of clinical care given to patients was measured against explicit standards. Quality indicators were derived from national sources and agreed with participating general practitioners.

Results: The overall standard of care was inadequate when judged against the quality indicators, irrespective of where patients lived. The overall prescribing of beneficial drugs for some conditions was deficient. For example, only 38% (11/29) (95% CI 20% to 58%) of patients were prescribed β blockers after myocardial infarction. The proportion of patients with heart disease or diabetes who had had their blood pressure measured in the past 2 years (heart disease) or past year (diabetes) was lower among those living in nursing homes: for heart disease, 74% (17/23) *v* 96% (122/127) (adjusted odds ratio 0.18, 0.04 to 0.75); for diabetes, 62% (8/13) *v* 96% (50/52) (adjusted odds ratio 0.05, 0.01 to 0.38). In terms of potentially harmful prescribing, significantly more patients in nursing homes were prescribed neuroleptic medication (28% (49/172) *v* 11% (56/526) (3.82, 2.37 to 6.17)) and laxatives (39% (67/172) *v* 16% (85/526) (2.79, 1.79 to 4.36)). Nursing home residents were less likely to have the appropriate diagnostic Read code linked to their prescribed neuroleptic drug (0.22, 0.07 to 0.71).

Conclusions: The quality of medical care that elderly patients receive in one UK city, particularly those in nursing homes, is inadequate. We suggest that better coordinated care for these patients would avoid the problems of overuse of unnecessary or harmful drugs, underuse of beneficial drugs, and poor monitoring of chronic disease.

Early life

DOES BREASTFEEDING IN INFANCY LOWER BLOOD PRESSURE IN CHILDHOOD? THE AVON LONGITUDINAL STUDY OF PARENTS AND CHILDREN

R. Martin[1], A. Ness[2], D. Gunnell[1], P. Emmett[2], G. Davey Smith[1], The Alspac Study Team[2]. [1]*Department of Social Medicine, University of Bristol, UK;* [2]*Unit of Paediatric and Perinatal Epidemiology, University of Bristol, UK*

Aim: Breastfeeding in infancy has been associated with decreased coronary heart disease mortality, but the underlying mechanisms are unclear. We investigated the association of breastfeeding with blood pressure in a contemporary cohort.

Design: Prospective cohort study.

Setting: Avon Longitudinal Study of Parents and Children, United Kingdom.

Participants: 7276 singleton, term infants born in 1991/1992.

Main Outcome Measures: Systolic and diastolic blood pressure measured at a mean age of 7.5 years.

Results: Complete data were available for 4763 children. The systolic and diastolic blood pressures of breastfed children were 1.2 mm Hg lower (95% CI 0.5 to 1.9) and 0.9 mm Hg lower (0.3 to 1.4), respectively, compared with children who were never breastfed (models controlled for age, sex, room temperature, and field observer). Blood pressure differences were slightly attenuated in fully adjusted models controlling for social, economic, maternal, and anthropometric variables (reduction in systolic blood pressure 0.8 mm Hg (0.1 to 1.5); reduction in diastolic blood pressure 0.6 mm Hg (0.1 to 1.0)). Blood pressure differences were similar whether or not breastfeeding was partial or exclusive. We examined the effect of duration of breastfeeding on blood pressure. In fully adjusted models, there was a 0.2 mm Hg reduction (0.0 to 0.3) in systolic pressure for each three months of any breastfeeding.

Conclusion: Our findings support the hypothesis that breastfeeding in infancy is associated with a lowering of later blood pressure in children born at term. If the association is causal, the wider promotion of breastfeeding is a potential public health strategy to reduce population levels of blood pressure.

DO MODIFIABLE FACTORS IN THE EARLY HOME AND SCHOOL ENVIRONMENT AFFECT COGNITIVE DEVELOPMENT DIFFERENTLY ACCORDING TO BIRTHWEIGHT?

B.J.M.H. Jefferis[1], C. Power[1], C. Hertzman[2]. [1]*Institute of Child Health, Centre for Paediatric Epidemiology and Biostatistics, London, UK;* [2]*Department of Health Care and Epidemiology, Faculty of Medicine, University of British Columbia, Vancouver, Canada*

Objectives: Previously we have shown that birthweight and social background both influence cognitive outcomes, when examined cross sectionally (in childhood and adulthood) and also as trajectories through childhood. While the effect of social background on cognitive trajectories is large and increased over time, the smaller birthweight effect remained constant over time. Our aim here is to investigate whether other home and school characteristics influence cognitive development and, further, if they modify the effect that birthweight has on cognitive trajectories.

Design: Birth cohort consisting of all births in England, Scotland, and Wales 3–9 March 1958.

Participants: 11 886 singleton males and females with gestational age between 32 and 44 weeks, with information on birthweight, maths tests, school, and home factors recorded at 7 years.

Main Outcome Measures: Maths tests (ages 7, 11, and 16 years) and trajectories of maths standardised scores: educational qualifications (by 33 years).

Results: All childhood tests and adult educational achievements increased significantly ($p < 0.05$) with all (a) home factors (parental interest in the child as rated by teachers, frequency of reading to the child, parents taking initiative to talk to the teacher), and all (b) school factors (presence of parent teacher association, contact with parents for social meetings and educational meetings).

In a repeated measures multilevel model of maths score trajectory (7 to 16 years) children of very interested parents improved in relative achievement more than children of parents with other levels of interest. This effect did not vary significantly by birthweight. Parents' frequently reading to the child positively influenced maths trajectories and this effect amplified over time. Furthermore, parents' reading affected maths trajectories differently according to birthweight (as indicated by a significant parental reading by birthweight interaction). To illustrate, low birthweight children who were read to most frequently improved in their maths trajectory relative to low birthweight children who were read to less often, although they did not catch up with their normal birthweight counterparts.

Conclusions: Modifiable factors in the early home and school environment influence cognitive function throughout childhood to early adulthood. Some factors, such as early parental reading, appear to act to reduce the adverse effect of low birthweight on the child's cognitive trajectories, whereas other factors, notably social class, have increasing effects over time but do not alter the birthweight effect. Because education level is related to adult health, potentially modifiable factors in early life that influence cognitive trajectories may ultimately influence health and function in later life.

BIRTH WEIGHT IN OFFSPRING AND CANCER MORTALITY IN PARENTS

U.B. Fallon[1], F. Rasmussen[2], P. Tynelius[2], D. Gunnell[1], Y. Ben-Shlomo[1], G. Davey Smith[1]. [1]*Department of Social Medicine, University of Bristol, Whiteladies Road, Bristol, UK;* [2]*Division of Epidemiology, Karolinska University Hospital, Stockholm, Sweden*

Background and Objectives: Adult height and birth weight have both been positively associated with cancer. One possible mechanism for this effect is through the growth hormone insulin like growth factor (IGFs) axis. Raised levels of IGF are associated with an increased risk of cancer. Activity of IGF may be modified both by environmental factors such as diet and genetic factors. Regardless of mechanism, birth weight may be a proxy for maternal IGF levels and an intergenerational effect on cancer might be expected. The objective of this study was to examine the association between birth weight in offspring and cancer mortality in parents.

Design: Record linkage nested case control study.

Setting: Sweden.

Participants: All parents of all births registered between 1973 and the end of 1997. Cases were parent–child pairs where the parent died of cancer. Controls were a 10% random sample of parent–child pairs, where the parent was cancer free at the end of follow up. When there was more than one child per parent, one was randomly selected.

Main Outcome Measures: Cancer mortality in parents.

Methods and Results: Hazards of site specific and overall cancer mortality associated with offspring birth weight were estimated using Cox proportional hazard regression modeling. In models controlling for gestational age, sex of offspring, parental age, and birth length, there was a positive association between birth weight and colon cancer in mothers; HR across quartiles 1, 1.35, 1.37, 1.70; p trend=0.05; n=294; difference in mean birth weight – 61.9 gm (95% CI –125.5 to 0.5). The hazard of death from breast cancer associated with offspring birth weight was; HR 1, 0.98, 1.02, 1.10; p trend=0.24; n=1920; difference in mean birth weight –21.3 (95% CI –45.9 to 3.3). In fathers, there was a positive association across quartiles of birth weight for testicular cancer; adjusted HR 1, 1.18, 1.49, 1.66; n=75; p=0.2; difference in mean birth weight –124.7 (95% CI –247.4 to –1.95). The association between birth weight and paternal colon cancer was weaker than in mothers and a dose response effect across quartiles was not evident. When very high birth weights (>4000 gm) were compared to the rest, the hazard ratio was 1.29 (95% CI 0.98 to 1.70; n=443) for paternal colorectal cancer and 1.62 (95% CI 1.14 to 2.29; n=256) for prostate cancer. Increasing quartiles of offspring birth weight were associated with a reduced hazard of death from smoking related cancers, and all cancers in both mother and father.

Conclusions: These results support the hypothesis that common factors influence both intra-uterine growth in offspring and cancer in parents. This inter-generational effect may be inherited, may be a result of shared environmental factors or both.

ASSOCIATION BETWEEN SIBLING NUMBER AND ALLERGIC DISEASES IN THE GLASGOW STUDENTS COHORT

S. Kinra[1], G. Davey Smith[1], M. Okasha[1], P. McCarron[2], D. Gunnell[1]. [1]*Department of Social Medicine, Bristol University, Bristol, UK;* [2]*Department of Epidemiology and Public Health, Queen's University Belfast, Belfast, UK*

Objective: The hygiene hypothesis suggests that exposure to infections in early childhood may reduce the risk of developing allergic diseases. We investigated this hypothesis by studying the association between household markers of frequent childhood infections (birth order, number of siblings, and father's social class) and allergic diseases.

Design and Setting: Cross sectional study of students who participated in a health survey while attending Glasgow University from 1948–68. Students provided information on whether they had a history of allergic diseases, number of siblings, birth order, and their father's social class.

Participants: This analysis is based on the 14 140 students (92.3%) aged 30 years and under for whom the data were complete.

Main Outcome Measures: Asthma, eczema, urticaria, and hay fever.

Results: 1677 (11.9%) subjects reported suffering from at least one of the four allergic diseases: 457 (3.2%), 594 (4.2%), and 885 (6.3%) subjects had asthma, eczema or urticaria, and hay fever, respectively. The age adjusted odds ratios (95% CI) for having an allergic disease decreased with increasing number of siblings (p_{trend} <0.001): 0.86 (0.75 to 0.99), 0.80 (0.69 to 0.93), and 0.70 (0.60 to 0.83) for those with one, two, and three or more siblings, respectively, when compared with those without siblings. A similar effect size and trend was noted with birth order. Lower social class of the father (registrar general's classification) was associated with lower odds of allergic disease, age-adjusted odds ratio being 0.87 (0.76 to 0.99), 0.78 (0.68 to 0.89), and 0.66 (0.52 to 0.85) for social classes II, III, and IV-V respectively as compared with social class I. There was no difference between the birth cohorts. Adjustment for birth cohort, father's social class, and sex did not greatly alter the results and there was no modification, of sibling or birth order effect, by sex or birth cohort of the subject. Among the four allergic diseases, hay fever showed the strongest association with sibling number with age adjusted odds ratios of 0.80 (0.66 to 0.95), 0.76 (0.62 to 0.93), and 0.60 (0.48 to 0.75) for those with one, two, and three or more siblings when compared with those without siblings.

Conclusions: These findings provide some evidence in support of the hygiene hypothesis. The documentation of these associations in these data from the first half of the past century and from a relatively homogeneous social group makes them all the more relevant.

CHD and diabetes

HELICOBACTER PYLORI INFECTION AND CHD IN THE COMMUNITY

J.A. Lane[1], L.J. Murray[2], I.M. Harvey[3], J.L. Donovan[1], M. Egger[1], R.F. Harvey[4]. [1]*Department of Social Medicine, University of Bristol, UK;* [2]*Queens University of Belfast, Belfast, UK,* [3]*Universtiy of East Anglia, Norwich, UK;* [4]*Frenchay Hospital, Bristol, UK*

Introduction: *H pylori* infection has been suggested as a risk factor for CHD in a number of observational studies, although a meta-analyses refuted a link between *H pylori* and CHD risk factors. We have investigated the association of *H pylori* with CHD as part of a randomised controlled trial of *H pylori* eradication and dyspepsia.

Design: Cross sectional data and double blind randomised placebo controlled trial.

Participants and Setting: Unselected community population aged 20–59 years in south west UK.

Intervention: Participants infected with *H pylori* randomised to eradication therapy or placebo.

Outcomes: Angina and myocardial infarction (MI) in *H pylori* positive and negative participants and at 2 years following randomisation of *H pylori* positive individuals.

Methods: All patients aged 20–59 years registered with seven primary care centres (N=26 203) were invited to take part in the project. Participants completed the Rose Angina questionnaire and *H pylori* infection was assessed by the ^{13}C urea breath test (UBT). Infected participants were randomised to receive eradication therapy or placebo for 2 weeks. A second blinded UBT was carried out at 6 months, the questionnaire repeated after 2 years. 1634 individuals testing positive were compared with 3268 randomly selected negatives using logistic models.

Results: 10 537 participants were recruited and 1634 (15.5%) were positive for *H pylori*. 1558 participants (95%) were randomised and 2 year follow up was obtained on 1438 participants (92%). *H pylori* infection was eradicated in 90.7% of those given active therapy. Angina was reported by 34/1634 (2.1%) participants who were positive for *H pylori* compared with 61/3268 (1.9%) of those negative (OR 1.11, 95% CI 0.73 to 1.71). Previous history of MI was reported by 27 (1.7%) participants positive for *H pylori* compared with 35 (1.1%) of those negative (OR 1.56, 95% CI 0.94 to 2.58). By intention to treat analysis, 17/787 (2.4%) of those who received active therapy had angina at 2 years, compared with 12/771 (1.7%) of those given placebo, OR=1.37 (95% CI 0.65 to 2.89). Two year incidence of MI was two participants in the active arm compared with four participants in the placebo arm (OR 0.48, 95% CI 0.09 to 2.68).

Conclusion: Self reported CHD in the community was not associated with *H pylori* infection and was not reduced following eradication. However, a wide age range was studied and a longer follow up is recommended to establish whether a genuine reduction in incident MI occurs following eradication.

IS THE ASSOCIATION BETWEEN PARITY AND CHD DUE TO BIOLOGICAL EFFECTS OF PREGNANCY OR ADVERSE LIFESTYLE RISK FACTORS ASSOCIATED WITH CHILDREARING?

D.A. Lawlor[1], J.R. Emberson[2], S. Ebrahim[1], P. Whincup[3], G. Wannamethee[2], M Walker[2], G Davey Smith[1]. *[1]Department of Social Medicine, University of Bristol, UK; [2]Department of Primary Care and Population Sciences, Royal Free Hospital School of Medicine, UK; [3]Department of Public Health Sciences, St George's Hospital Medical School, UK*

Background: Parity is associated with CHD risk. Because pregnancy is a state of relative insulin resistance, it has been assumed that this is due to the adverse effects on lipid and carbohydrate metabolism of repeated pregnancies. An alternative explanation is that having large numbers of children is associated with adverse lifestyle risk factors such as a high fat diet and physical inactivity. One way to assess this possibility is to compare the association between number of children and CHD in women and men.

Design: Cross sectional study of 4286 women and 4252 men, aged 60–79 years, from 24 British towns.

Main Outcome Measure: CHD.

Results: Number of children was positively and linearly associated with body mass index and waist to hip ratio in both sexes. In women, but not in men, number of children was inversely linearly associated with high density lipoprotein cholesterol and positively linearly associated with triglycerides and diabetes. Women with four or more children were more insulin resistant than women with fewer or no children. For both sexes, "J" shaped associations between number of children and age adjusted prevalent CHD were observed, with the prevalence being lowest among those with two children and increasing linearly with each additional child beyond two. For those with at least two children the age adjusted odds ratio of CHD per increase in 1 child was 1.30 (95% CI 1.17 to 1.44) for women and 1.12 (1.02 to 1.22) for men. There was no strong evidence of a difference between women and men in the magnitudes of the age adjusted associations between number of children and CHD (p values for tests of interaction for both quadratic and linear components >0.2). Adjustment for obesity and components of the insulin resistance syndrome attenuated the associations between greater number of children and CHD prevalence in both sexes, though in women some association remained with full adjustment for all potential confounding and explanatory factors. For those with at least two children the fully adjusted odds ratio of CHD per increase in 1 child was 1.22 (1.07 to 1.39) for women and 0.98 (0.87 to 1.10) for men.

Conclusions: Lifestyle risk factors associated with childrearing lead to obesity, and result in increased CHD risk in both sexes. The biological responses of pregnancy associated with insulin resistance may have additional adverse effects in women who have large numbers of children.

HAS THE IMPACT OF PASSIVE SMOKING ON CHD RISK BEEN UNDERESTIMATED? EVIDENCE FROM THE BRITISH REGIONAL HEART STUDY

P.H Whincup[1], J.A. Gilg[1], M.J. Jarvis[2], A. Bryant[4], C. Feyerabend[4], M.K. Walker[3], D.G. Cook[1]. *[1]Department of Community Health Sciences, St George's Hospital Medical School, London, UK; [2]Department of Epidemiology and Public Health, UK; [3]Department of Primary Care & Population Sciences, Royal Free & University College Medical School, London, UK; [4]Medical Toxicology Unit, New Cross Hospital, UK*

Background: Assessment of the effect of passive smoking on CHD risk has generally been based on exposure to cigarette smoking by a domestic partner, which is consistently associated with an increase in CHD risk of about 30%. However, few studies have examined the relation between passive smoking exposure and CHD using biological markers, particularly cotinine.

Objective: To examine the influence of passive smoking exposure measured by cotinine on CHD incidence.

Design: Prospective population based study based in general practice.

Subjects: 4729 men in 18 towns who in 1978–80 provided baseline blood samples (later used for cotinine assay) and a detailed smoking history.

Main outcome: Major CHD events, fatal and non-fatal, over 20 years.

Results: 2105 men reported themselves non-smokers at baseline and had cotinine levels consistent with this (<14.1 ng/ml); 308 had a major CHD event during follow up. The 2105 men were divided into four equal groups on the basis of cotinine level (0–0.7; 0.8–1.4; 1.5–2.7; 2.8–14.0 ng/ml). Relative hazards (95% CIs) for CHD in the second, third, and fourth quartiles of cotinine level compared with the first were 1.46 (1.01 to 2.13), 1.52 (1.04 to 2.22), and 1.65 (1.12 to 2.43), respectively, after adjustment for established CHD risk factors. Hazard ratios (cotinine 0.8–14.0 *v* 0–0.7 ng/ml) were particularly increased during the first (3.82, 95% CI 1.36 to 10.73) and second 5 year follow up periods (1.85, 95%CI 1.04 to 3.29) compared with later periods.

Conclusion: These estimates of the influence of passive smoking exposure on CHD risk appear somewhat greater than those based on partner smoking. Moreover, the markedly higher estimates obtained during the first 10 years of follow up (when population smoking prevalence was still high) compared with the second 10 years suggest that long term prospective studies that have examined the effect of passive smoking against a background of declining smoking prevalence may have underestimated the true effect of high intensity passive smoking exposure on CHD risk.

WEIGHT LOSS AND SUBSEQUENT DIABETES STATUS IN OBESITY

L. Aucott[1], A.S. Poobalan[2], W.C.S. Smith[1]. *Departments of [1] Public Health, [2]Child Health, University of Aberdeen, Aberdeen, UK*

Background: Obesity is now recognised as a chronic disease and described as an escalating epidemic. Incidence of type 2 diabetes is also increasing with similar proportions. Weight loss in obese patients has been associated with clinical improvements but this is mostly based on short term studies. There is a lack of evidence of the long term effects of weight loss in obese individuals.

Aims: To review the evidence for long term effects of weight loss on diabetes outcomes in obese people or for those at risk of developing type 2 diabetes.

Methods: Systematic review of long term studies published between 1966–2001.

Results: 11 studies with follow up period of more than 2 years were included in the review. Results show that the mortality relative risks of those with diabetes who lost weight intentionally were significantly reduced by as much as 25%. In particular, weight loss of 9–13 kgs was seen to be most protective. For patients at risk of developing diabetes due to either a family history of diabetes or impaired glucose tolerance, saw a reduction of this risk for those who lost some weight compared with those who remained weight stable. Those with large weight losses achievable with surgical interventions reduced their risk by at least 63%. Finally, those already with type 2 diabetes are considered. Of these, approximately 80% improved their metabolic handling of glucose after weight loss.

Conclusions: The intentionality of weight loss in obese patients seems to be an important feature, with deliberate weight loss being beneficial for type 2 diabetes. Mortality risk and risk of developing diabetes is reduced in the long term with weight loss and those with type 2 diabetes often have reduced clinical symptoms after weight loss. The long term benefits increase with the amount of weight loss. However, the methodological quality of long term prospective studies need to be improved and standardised to accurately assess the effects of weight loss for obese individuals.

Methods I

INVESTIGATING PARTICIPATION BIAS IN CASE-CONTROL STUDIES

G.R. Law[1], M.S. Gilthorpe[2], S.O.M. Manda[2], E. Roman[1]. *[1]Epidemiology and Genetics Unit, School of Medicine, University of Leeds, Leeds, UK; [2]Biostatistics Unit, School of Medicine, University of Leeds, Leeds, UK*

Introduction: Case-control studies are a popular epidemiological tool for investigating genetic and environmental associations with disease. Population based studies aim to enrol all cases diagnosed during the study period in a particular population. Studies have used a variety of methods for selecting a random and appropriate control group, such as the electoral role, health service lists, and random digit dialling. However, signed consent is usually required from participants, particularly when direct measurements or biological materials are wanted. This potentially leads to selection bias in the comparison group—it is not a true representation of the underlying population at risk. Previous work has shown that even well designed randomly selected control groups suffer due to the effects of participation. These often manifest themselves in the sociodemographic composition of the comparison group, and unfortunately many putative disease agents are potentially linked to aspects of wealth, socioeconomic status, or ethnic group. In practice it has been very difficult to "adjust" for participation bias.

Objectives: There are three stages (1) simulate participation bias; (2) use simulations to evaluate recovery of the "true" risk estimates, and (3) apply these methods to the UK childhood cancer study.

Methods: Estimates of participation bias are derived from the literature and the UK childhood cancer study. Hypothetical data, informed by these estimates, are generated containing participation bias. Two strategies considered are where a participant's socio-demographic background is differentially related to: (a) exposure; and (b) the likelihood of participation.

Results: It is feasible to simulate data that emulate participation bias. However, assumptions underpinning the simulated data are theoretical, based on empirical evidence of real data and may not always tally with a genuine underlying mechanism giving rise to real data. Further work is needed to evaluate the robustness of the estimated participation function. The proposed methods of recovery for the true risk depend on several factors, such as the degree of overlap between cases and controls with respect to sociodemographics. Preliminary application of these methods to the national UK childhood cancer study will be reported.

Conclusions: These results suggest that future case-control studies should not disregard potentially useful information about non-participants, to allow some form of investigation into participation bias.

SINGLE PATIENT TRIALS: EXPLORING PATIENTS' PERSPECTIVE USING QUANTITATIVE AND QUALITATIVE METHODS

S.T. Brookes[1], C. Paterson[1], C. Pope[1], P. Dieppe[1]. *[1]MRC Health Services Research Collaboration, Department of Social Medicine, University of Bristol, Bristol, UK*

Objective: In many chronic conditions, such as osteoarthritis, there is considerable individual variation in response to treatment, making provision of optimal therapy difficult. N-of-1 or single patient trials are a novel study design delivering the highest strength of evidence for determining individual treatment. Patients act as their own controls, receiving all treatments under comparison; symptoms important to the individual are measured. Such trials are however, under-exploited and little is known about the experience of participating in them. This study used a combination of quantitative and qualitative methods to explore the feasibility of single patient trials and patients' experience of participating in them.

Design: In this pilot study patients were recruited to a 12 week single patient trial comparing a standard and heat retaining knee support with no support. Patients were interviewed at recruitment and at the end of their individual trial; during each 12 week trial daily diaries were completed. Results of each trial informed patient and clinician's decision on future treatment.

Participants: Eligible patients had osteoarthritis of the knee and were attending a UK hospital clinic.

Main Outcome Measures: The daily diaries incorporated a standard patient questionnaire (WOMAC) and a patient generated outcome measure (MYMOP). Qualitative interviews explored decision to participate, experience and acceptability of research design, and outcome measures.

Results: All eligible patients approached (five women aged between 50 and 67 years) were keen to be recruited and went to great lengths to complete their trials properly. Whilst quantitative methods found no significant differences between the supports, qualitative interviews identified benefits for some patients. Diary completion gave several patients more insight into their problem, which was confirmed when diary score analysis was discussed with them. This led one participant to seek surgical help and two to make adjustments to their activity levels.

Conclusions: N-of-1 or single patient trials are feasible and well received by patients in secondary care. From the patients' perspective single patient trials may have benefits over and above those of any particular intervention. Participating in such a study design may benefit the doctor-patient relationship and encourage shared decision making, which is especially important in chronic disease.

INVOLVING "HARD TO REACH" FAMILIES IN RESEARCH—A QUALITATIVE STUDY EXPLORING THE VIEWS OF WOMEN WHO CHOSE NOT TO PARTICIPATE IN A RANDOMISED CONTROLLED TRIAL OF A HOME VISITING SERVICE FOR "VULNERABLE" EXPECTANT WOMEN

S. Kirkpatrick, J. Barlow. *Health Services Research Unit, Department of Public Health, University of Oxford, Oxford, UK*

Background: The Home Visiting Study is a randomised controlled trial evaluating the effectiveness of a new home visiting service that is being provided by 49 health visitors to pregnant women who are experiencing significant environmental and psychological difficulties. However, it is recognised that interventions aimed at high risk members of the population very often fail to recruit the individuals who most stand to benefit from the intervention and a qualitative study was conducted alongside the main trial with the aim of establishing the reasons why some women chose not to take part in the study.

Method: Women who had been screened as eligible but opted not to take part in the study were invited to take part in a short individual interview. The focus of the interview was to listen to their concerns about participating in the study, and to explore their perceptions about the new service.

Results: A number of themes emerged from the data, including differences in perceptions of vulnerability between professionals and participants, feeling too overwhelmed by existing problems to be able to contemplate participation, misperceptions and misgivings about the service, and lack of trust. Many women viewed the intervention and research as an added burden as opposed to a potential means of support. Concern was also expressed about the issue of randomisation.

Conclusion: Women who refuse to take part in early interventions are a diverse group, some of whom are articulate about their reasons for not taking part and some of whom are disempowered, disinterested, disengaged, anti-authority, uncommunicative, and particularly "hard to reach". Service providers need to take this diversity into account if they are to improve uptake of services. They may also need to find ways of working in partnership with parents, and of establishing a sufficiently trusting relationship with some of this group of women to enable them to begin to think about accepting early intervention services. Researchers should give some consideration to the impact of randomisation, especially where inclusiveness of a disadvantaged group is important.

USING COMMUNITY RESEARCHERS IN THE EVALUATION OF THE HEALTHY LIVING APPROACH TO COMMUNITY DEVELOPMENT IN PEMBROKESHIRE

A. Evans , D. Cohen[2], M. Nugent[3], F. Rapport[4], H. Snooks[4]. *[1]Pembrokeshire SHARP Project, [2]University of Glamorgan, [3]Third Sector First and University of Leeds, [4]University of Wales Swansea, UK*

Introduction: Local people in two deprived communities were recruited and trained as community interviewers, as part of a wider evaluation of "healthy living" funded through the Welsh Assembly Government's SHARP Programme.

Aim of Study: To assess the process, benefits, and deficits of involving local people in data gathering.

Methods: The posts were advertised in leaflets and local press. Trainee researchers were selected on application form and interview. After completing training—accredited at Level II with the Open College Network—the community researchers conducted face to face semi-structured interviews with a sample of residents in each community. The community researchers and authors carried out qualitative analysis. During fieldwork, community researchers held regular team meetings to discuss progress and reflect on the research. Two of the authors conducted group interviews with seven of the researchers.

Results: Recruitment and training of community interviewers*:* 24 people applied; 10 were appointed by a panel that included community representatives; eight researchers gained accreditation. Community interviews: 92 interviews were carried out by nine researchers, including 16 with members of locally defined hard to reach groups; an overall response rate of 44%. Benefits and deficits of involvement*:* the community researchers reported a sense of increased self worth, confidence, and skills; some went on into further training and/or employment. There was group consensus that OCN accreditation contributed towards raised self esteem; that team spirit supported and sustained them; that other local people could be more directly involved in the project; that they could train others to become researchers. However, some reported that they felt unable to satisfy local expectations and had no power to determine the future direction of the wider project. Interview results have been presented by the community researchers in the form of a video.

Discussion: The community researchers had the motivation, ideas, and the capacity to work beyond the limits of their role, they also wanted more influence on decision making in the project. This suggests that community involvement should consider ownership and leadership and not be limited to tasks.

Conclusions: "Deprived" communities contain varied and valuable resources in their residents; community researchers were able to carry out and analyse interviews competently. Involvement in the research process created motivated participants who felt valued as individuals and as community representatives. Their involvement in the project could be widened.

General practice

ANTIBIOTIC PRESCRIBING AND RESISTANCE: WHAT IS THE ADDED VALUE OF PERSON SPECIFIC DATA ABOUT ANTIBIOTIC PRESCRIBING COMPARED WITH EXISTING, PRACTICE LEVEL INFORMATION?

P.T. Donnan[1], P.G. Davey[2], L. Wei[2], R. Clark[3], F.M. Sullivan[1]. [1]*Tayside Centre for General Practice,* [2]*Medicines Monitoring Unit, Dept Clinical Pharmacology, Ninewells Medical School, University of Dundee, Dundee;* [3]*Information & Statistics Division, Scottish Office, Edinburgh, UK*

Background: Antibiotic resistance is a major public health problem. In the UK prescribing data are currently only routinely available at the level of a primary care practice. There are both financial and data protection barriers to analysis of data about individuals.

Aim: The aim of this study was to test the null hypothesis that, in comparison with practice level data, there is no added value to patient level data for measurement of the association between antibiotic prescribing and resistance.

Methods: We performed a cross sectional study that linked data about resistance to trimethoprim in bacteria isolated from urine samples to prescribing of trimethoprim and other antibiotics. We used a random coefficient model with random and fixed effects, effectively a multi-level model with two levels: primary care practice and individual patient.

Results: The study included 28 Tayside practices in the Ninewells catchment area with a total study population of approximately 166 000 people. The population of a single practice ranged from 1342 to 10 653. There was considerable variation between practices in both the prevalence of trimethoprim resistance (from 15% to 50% of bacteria isolated) and trimethoprim prescribing (from 67 prescriptions to 357 prescriptions per 100 people in the practice). None the less, in a multivariate analysis there was no relationship between variation in prescribing and resistance (p=0.270) at the practice level. In contrast, at the patient level there was a highly significant relationship between trimethoprim resistance and prior exposure to trimethoprim (p <0.0001) and independently, antibiotics other than trimethoprim (p=0.002).

Discussion: Analysis of practice level data may obscure important relationships between antibiotic prescribing and resistance. This is an example of the ecological fallacy, which assumes that differences in exposure at the population level indicate similar differences in exposure to the individuals within the population. Our results are an important demonstration of the added value of individual patient data for research on the outcomes of prescribing.

TURNING ELECTRONIC PATIENT DATA INTO STRATEGIC KNOWLEDGE IN GENERAL PRACTICE—THE HYPER TRIAL

E. Mitchell[1], F. Sullivan[1], G. Watt[2]. [1]*Tayside Centre for General Practice, Dundee University, UK;* [2]*General Practice and Primary Care, Glasgow University, UK*

Objective: Primary care computerisation has increased dramatically in recent years. Practitioners can access information to inform management of individual patients attending for treatment, but extracting richer data to inform more strategic decision making is complex and, as such, remains "hidden" in the system. The "rule of halves" predicts that half of the hypertensive population are not known, half of those known are not treated and half of those treated are not controlled. To address this, practices require information on all potentially at risk patients. Accessing data held in practice computer systems is one of the best ways to obtain this. The aim of this study was to evaluate the provision of different levels of feedback developed from computerised data.

Setting and Design: 52 Scottish practices were randomised to three groups: audit feedback, strategic feedback prioritising patients by absolute risk of death from stroke, and control. Electronic data on demography, morbidity, and prescribing were extracted from practice computer systems and relevant feedback developed.

Main Outcome Measures: Proportions of hypertensive patients aged 65–79 detected, treated, and controlled.

Results: Most 65–79 year olds had a blood pressure record at initial data download (audit 65.8%; strategic 81.2%; control 77.6%). The numbers in each group increased over the study period, as did numbers with a normal blood pressure (<160/90 mm Hg) (audit 8%; strategic 8.7%; control 10.5%). The majority of known hypertensive patients in each group were initially receiving anti-hypertensive medication (audit 87.5%; strategic 84.3%; control 84.3%). Around 40% in each group had a blood pressure of ⩾160/⩾90. Over the study period, numbers of untreated patients and uncontrolled patients reduced, although this still accounted for around one third of all hypertensives. There was a significant difference in mean systolic pressure between the strategic and audit groups and a significant difference in patients controlled in the strategic group compared with the other two groups.

Conclusions: Improvements were seen in the ascertainment and treatment aspects of the rule of halves. Although there were still significant numbers of treated yet uncontrolled hypertensives, sending patient specific feedback to practices can produce a significant difference in control with consequent reductions in individual patient risk. The potential exists for the further application of the HYPER methodology to other conditions where a strategic approach may improve care. This is particularly pertinent given the new GP contract, which is likely to increase demands for practice data to support claims for reimbursement based on the quality of care provided.

GPS' CONFIDENCE IN BREAST CANCER GENETICS: EVALUATION OF A PASSIVE COMPUTERISED DECISION SUPPORT INTERVENTION

N. Torrance[1], B. Wilson[2], J. Mollison[1], on behalf of the ARC Study Team. [1]*Department of Public Health, University of Aberdeen, UK;* [2]*Department of Epidemiology & Community Medicine, University of Ottawa, Canada*

Objective: The study was designed to evaluate whether a simple computerised decision support system accompanied by a single educational session improved GPs' confidence in their management of patients concerned about family history of breast cancer.

Design: The intervention was evaluated using a cluster randomised controlled trial, with collection of outcome data from GPs, patients, and administrative systems of the Cancer Genetics Clinic.

Setting and Participants: General practices in the Grampian Health Board area were randomised to intervention (57 practices, 230 GPs) or control (29 practices, 116 GPs) groups. Patients were eligible for inclusion if they were referred to the Cancer Genetics Clinic for breast cancer counselling in the defined pre- or post-intervention periods.

Main Outcome Measures: The primary outcome was GPs' self reported confidence in managing patients concerned about their genetic risk of breast cancer. We also examined patterns of risk of referred patients, completeness of referral information, patient risk perceptions, patients understanding of breast cancer risk factors, and factors influencing the use of the intervention.

Results: Twenty seven GPs (11.7%), from 20 (35.1%) practices, attended an educational session and the software was disseminated to all practices. GP survey response rates were 78.6% (pre-intervention) and 68.3% (post-intervention). Sixty four (42.4%) intervention respondents indicated awareness of the software, and 22 (34.4%) had used it at least once. Then median number of referrals per practice was one in both the intervention (range 0–11) and control group (range 0–4). No statistically or clinically significant differences were seen between intervention and control groups in the main measures of GP confidence, patterns of risk of referred patients, or patient knowledge or perceptions of risk.

Conclusion: Despite perceptions of increasing patient demand, GPs refer relatively few patients for breast cancer genetic counselling. They appear generally unsure of how to manage patients concerned about breast cancer risk. The intervention did not significantly improve confidence or alter referral patterns, or patients' risk perceptions or knowledge. These findings are consistent with evaluations of more sophisticated decision support systems for other conditions. Although genetics is likely to continue to be an area of concern for GPs, developing genuinely relevant and cost effective interventions is likely to be a challenge.

PEOPLE'S UNDERSTANDING OF INFORMATION ABOUT INHERITED RISK: EXPERIENCES OF SCREENING FOR FAMILIAL HYPERLIPDIAEMIA

D. Marks[1], M.G. Boulton[2], M. Thorogood[3]. [1]*Health Promotion Research Unit, London School of Hygiene & Tropical Medicine, UK;* [2]*School of Social Sciences and Law, Oxford Brookes University, UK;* [3]*Warwick Medical School, University of Warwick, UK*

Background: The use of genetic testing is increasing, and concerns about the psychological and social consequences of such testing have been expressed but not adequately addressed by appropriate research. We report a study of the experiences of relatives tested for

familial hypercholesterolaemia (FH), a modifiable genetic condition that leads to premature heart disease.

Objective: To explore how participants in screening for inherited risk make sense of the information they are given.

Methods: A purposive sample of 20 participants were recruited from the Oxford Lipid Clinic. Nine people were positive for FH, four were borderline, and seven negative. Semi-structured, in depth interviews were conducted, tapes were transcribed and analysed. Emerging themes were identified.

Results: The recollection of information given about FH is minimal, and often at odds with professional accounts. Although these interviewees had given informed consent, their awareness of what to expect in the event of a positive or a negative diagnosis was very low. Even those people testing negative or receiving an inconclusive "borderline" diagnosis experienced detrimental effects such as repeat testing or anxiety. Knowledge of the disorder, expectations of the test and awareness of the consequences are constructed by a number of factors: family history, general awareness of cholesterol and its health effects, discussions with health care providers, and access to leaflets or the internet to substitute existing knowledge. Messages are inconsistent, and because high cholesterol is such a common term, the importance of the familial aspect is often lost. People make sense of the information in relation to their own experiences. Some people overestimate their risk while others do not accept the implications of their diagnosis for their long term health. Although people understood the benefits of cholesterol lowering medication, they expressed reluctance to embark on a lifetime of treatment.

Conclusion: We have highlighted problems in conveying probabilistic risk information. What people recall being told is often inconsistent with what health professionals consider has been conveyed. People coming from high risk families still feel vulnerable, even after testing negative for inherited high cholesterol. The process of being screened for a modifiable genetic condition such as FH has some adverse effects that have not previously been described.

Women's health

WOMEN'S PREFERENCES FOR ACCESSING EMERGENCY CONTRACEPTION: AN IN DEPTH INTERVIEW STUDY

R. Locke, A. Graham, M.C. Weiss. *Primary Health Care Division, University of Bristol, UK*

Objectives: To explore women's views on the increase in availability and range of service providers of emergency contraception.

Design: Qualitative study using in depth interviews.

Participants: Twenty nine women using emergency contraception.

Setting: Two walk-in centres and two pharmacies.

Results: Women value convenience in accessing emergency contraception. Venues such as walk-in centres and pharmacies are preferred in this regard as women do not need an appointment and these venues may be close to where they either work or live. In addition, women like the anonymous nature of these alternative providers, particularly where providers are neutral and non-judgmental in their approach. Women do not necessarily view these consultations as an appropriate time to receive advice on general contraception. Women who do want a greater degree of privacy and advice tend to seek out the walk-in centre as their source of emergency contraception. All respondents share a high degree of motivation in not wanting to get pregnant and view the charge of £24 levied in pharmacies as reasonable. Women are ambivalent about the increased availability of emergency contraception. On the one hand, for users like themselves where it is used as a safety net and not as contraception, increased availability is a good thing. On the other hand, the supply of emergency contraception should be monitored for "misuse", particularly by younger women.

Conclusions: Many women prefer the anonymous nature of emergency contraception supply from alternative providers such as pharmacies and walk-in centres. If policy makers wish to increase the uptake of emergency contraception by certain groups (eg younger, working class women) they should emphasise the anonymity of these providers and ensure that these providers supply emergency contraception in a non-judgmental manner, without the undue probing and recording of personal information.

EARLY LIFE INFLUENCES ON AGE AT MENOPAUSE

R. Hardy, D. Kuh. *MRC National Survey of Health and Development, Department of Epidemiology and Public Health, Royal Free and University College Medical School, London, UK*

Background: The cessation of menstruation at menopause is the most prominent marker of reproductive ageing and has implications for women's disease risk in later life. Few adult risk factors have been consistently associated with age at menopause. Factors operating during development may influence timing of menopause by affecting the initial number of follicles laid down and their loss in utero and during the postnatal pre-pubertal period.

Objectives: To examine whether early life socioeconomic environment and serious childhood illness influence age at menopause.

Design: Birth cohort study.

Subjects: 1572 women from England, Scotland, and Wales, followed up since birth, currently until 54 years of age.

Methods: Age at menopause was defined using self reports of last menstrual cycle. Cox's proportional hazards models were used to model the relationships. Follow up was until menopause or for women who had not reached menopause follow up was censored at the first of the following events: start of hormone replacement therapy (HRT), hysterectomy operation, last contact when still pre- or perimenopausal. The influence of possible adult confounders such as smoking and nulli parity, which are known to advance the menopause, was considered.

Results: Parental divorce before the cohort member was 15 years of age was associated with an earlier menopause (hazard ratio (HR) 1.4, 95% CI 1.0 to 2.1), the earliest menopause being seen in those where divorce occurred in the age range 0–4 years (HR 2.1, 95% CI 1.3 to 3.4). Parental death was not associated with age at menopause. Childhood manual social class (HR for most *v* least disadvantaged 1.4, 95% CI 1.1 to 1.7) and crowded household conditions (HR 1.5, 95% CI 0.9 to 2.5) were associated with an earlier menopause, in contrast to adulthood indicators of socioeconomic disadvantage where no consistent association was seen. None of these effects were reduced after adjustment for adult smoking, parity, socioeconomic status, or psychological distress. There was some confounding between these early life variables and early life variables found previously to be related to age at menopause, breast feeding, and cognitive function. Women who experienced serious illness before age 15 years had a slightly earlier menopause and this was largely due to the women who had had polio (HR 2.5, 95% CI 1.0 to 6.0). This was somewhat confounded with parity as those who experienced illness were less likely to have children.

Conclusions: These results, together with previous findings from the study, provide evidence for a number of underlying mechanisms linking developmental experience to ovarian ageing.

EXPECTED AND UNEXPECTED COMPLICATIONS OF HYSTERECTOMY

K. McPherson, A. Herbert, A. Judge. *MRC HSRC Department of Social Medicine, University of Bristol, UK*

Objective: To examine and compare the incidence and determinants of serious operative complications, and long term consequential (unintended) effects on health following surgical management for heavy menstrual bleeding (menorrhagia) of benign causes.

Design: Longitudinal cohort of 26 000 women treated by three types of surgeries for menorrhagia, monitored prospectively for mortality and cancer morbidity via NHS Central Register, and surveyed at 1, 3, and 5 years after surgery.

Setting and Participants: The sample consists of 9495 women with just the lining of the womb removed (transcervical endometrial ablation; TCRE), 10 089 women with hysterectomy (removal of the womb and cervix), and 6475 women with hysterectomy and both ovaries removed (prophylactic bilateral oophorectomy). All participants had dysfunctional uterine bleeding (DUB) or heavy periods, as the first indication, and were part of the national cohort of all hysterectomies and TCRE in England, Northern Ireland, and Wales between 1993 and 1995.

Main Outcome Measures: Serious operative and early postoperative complications; hospital readmissions; use of HRT and other unexpected long term outcomes; bladder problems; cancer incidence rates; heart and vascular disease; suicides; and related mortality rates.

Results: Latest findings will be presented for the first time—for discussion. These procedures are major interventions with significant plausible effects on women's remaining pelvic organs, their hormonal milieus, as well as (possibly consequentially) psychological and sexual functioning. They have differential risks for urinary problems, cancer incidence, heart disease, and suicide, for example.

Conclusions: Around 20% of women have a hysterectomy and a further 15% have hysterectomy with bilateral oophorectomy by the time they are 60 years old. Very few have TCRE in normal practice. In fact, since its introduction in the early 1990s, the rates of surgical

management have increased overall. Controversy still reigns about each of these procedures as last resort treatment for heavy periods (or fibroids)—partly because such follow up studies are never done. There are massive temporal, regional, and national variations in the use of these procedures and indeed uncertainty about heavy periods themselves. Hysterectomy prevents fertility and may deplete ovarian function, and bilateral oophorectomy deletes ovarian function. TCRE may have a much less serious effect, and certainly a few women have become pregnant after the surgery, but it may not prevent periods, and some women (around 30%) require a subsequent hysterectomy. All of this also results in increased use of HRT, with its own subsequent risks and benefits. What else should go into the proper balance that women do not know about yet?

POST-MASTECTOMY PAIN SYNDROME: LONGITUDINAL FOLLOW UP OF BREAST CANCER SURVIVORS

L. McEvoy[1], J. Bruce[2], N.W. Scott[2], W.C.S. Smith[2], W.A. Chambers[1]. *[1]Departments of Anaesthesia and [2]Public Health, University of Aberdeen, Medical School, Aberdeen, Scotland, UK*

Introduction: Post-mastectomy pain syndrome (PMPS) is a recognised complication in women surviving breast cancer surgery, although little is known about the long term progression and outcome of this chronic pain condition. In 1996 a questionnaire survey of 408 women in the Grampian region, who had undergone mastectomy between 1990 and 1995, identified a prevalence of PMPS of 43%.

Objective: To assess the long term outcome of this cohort at 7–12 years postoperatively; to describe the natural history of PMPS and its impact upon quality of life.

Design: Longitudinal cohort study using questionnaire methodology; assessment of nature; and intensity of pain using the McGill Pain Questionnaire (MPQ), the UCSF-Pain Service Questionnaire, and SF-36.

Subjects: Women who had undergone mastectomy between 1990 and 1995; follow up was confined to 175 of the 408 women who reported PMPS in 1996.

Main Outcome Measures: Prevalence of PMPS at 7–12 years postoperatively; pain characteristics using body charts, McGill Pain Questionnaire (MPQ), and USCF Pain Service Questionnaire; and quality of life assessed using the SF-36.

Results: Completed questionnaires were obtained from 113 (82%) of the 138 women alive and living in Grampian. Of these, 54 were now pain free and 59 had persistent PMPS. The prevalence of PMPS in this cohort was 52% (59/113), or 14% of the original 408 respondents. Women who reported PMPS at 7–12 years postoperatively were significantly younger and heavier than women whose PMPS had resolved (mean age 49.5 *v* 56.2 years; p=0.001; mean weight 70.5 kg *v* 63.9 kg, p=0.004). Of the 59 women with persistent PMPS, 45 reported problems using their arm and 24 reported swelling of the arm on the side of surgery. The most common MPQ descriptive terms included stabbing, shooting, nagging, tight, aching and numb; this was similar to the pain descriptors selected in 1996. Even in the group still experiencing PMPS, pain and quality of life scores had tended to improve since 1996, although this was only statistically significant for the physical functioning domain of the SF-36 (p=0.006).

Conclusion: PMPS causes considerable morbidity in a proportion of women who have had mastectomy. PMPS was found to persist up to 12 years postoperatively in half or our cohort with pain in 1996, with younger women particularly at risk of persistent pain.

Economic evaluation

THE HEALTH IMPACT OF STATE SUBSIDISED ECONOMIC DEVELOPMENT: A SYSTEMATIC REVIEW

M. Egan, M. Petticrew, V. Hamilton, D. Ogilvie. *MRC Social and Public Health Sciences Unit, University of Glasgow, UK*

Objective: To review the available evidence on the positive and negative health impacts of economic development interventions in which public money is invested in business to create or safeguard jobs. Interventions include state subsidies and other forms of financial assistance to private or nationalised businesses outside of welfare.

Design: Systematic review of prospective and retrospective primary intervention studies.

Data Sources: Prospective and retrospective primary intervention studies in OECD countries from 1945 to the present in any language or format identified from medical, social science, economic and grey literature databases, personal collections, expert consultation, and reference lists.

Main Outcome Measures: Health and wellbeing, illness and injury, and socioeconomic change.

Results: Relevant studies were critically assessed from an initial search of over 9000 abstracts. In many cases, pubic investment in business had little or no effect on employment or health. In some cases it resulted in redundancies among public sector employees "crowded out" by subsidised private sector growth. This shift from public to private sector does not appear to have adversely affected employees in terms of occupational health and safety.

In cases where employment growth did follow public investment in business, the health beneficiaries were not always those in greatest need. Targeting of deprived areas for economic development programmes frequently benefited people from more affluent neighbouring areas, who already had the skills and experience to obtain new work. This new workforce could either commute or move into the deprived areas, leading to gentrification and displacement of the original residents. In this way, state subsidised economic development could encourage social polarisation and its attendant health inequalities.

Conclusion: State subsidies to business have the potential to affect health outcomes of employees and communities. However, the beneficiaries of targeted economic development are not always those in greatest need.

IS PROVISION AND FUNDING OF CARDIAC REHABILITATION APPROPRIATE FOR THE ACHIEVEMENT OF NATIONAL SERVICE FRAMEWORK GOALS?

I. Griebsch[1], J. Brown[1], K. Rees[2], S. Turner[3], A.D. Beswick[2], S.E. Ebrahim[2], R.R. West[4], R. Taylor[5], M. Burke[2], F.C. Taylor[6], J. Victory[7]. *[1]MRC Health Services Research Collaboration, Bristol, UK; [2]Department of Social Medicine, University of Bristol, UK; [3]Basingstoke and Alton Cardiac Rehabilitation Centre, UK; [4]University of Wales College of Medicine, UK; [5]Department of Public Health and Epidemiology, University of Birmingham, UK; [6]Bristol Heart Institute, UK; [7]United Bristol Healthcare NHS Trust*

Background: In England the National Service Framework for Coronary Heart Disease states that every hospital should ensure that more than 85% of patients discharged from hospital with a primary diagnosis of acute myocardial infarction, or after coronary revascularisation, are offered cardiac rehabilitation. Reliable information on the number of patients who may benefit from cardiac rehabilitation and the level and costs of provision is important for health policy planning.

Methods: Population need for outpatient cardiac rehabilitation in England was estimated using the Health Episode Statistics database for 1999–2000. Data were collected for discharge diagnoses of acute myocardial infarction, unstable angina, and revascularisation. To estimate the level of provision, centres contributing to the British Association for Cardiac Rehabilitation/British Heart Foundation survey were contacted. We imputed the interquartile range obtained from responding centres (67%) and estimated the total number of patients referred and who joined a cardiac rehabilitation programme in England. Survey data and detailed interview of rehabilitation coordinators were used to estimate costs attributable to staffing, overheads, building capital, and equipment.

Results: In England 131 089 patients were potentially eligible to receive cardiac rehabilitation in the year 2000. Of these 45–67% were referred to a cardiac rehabilitation programme and 27–41% attended. Some spare capacity to increase coverage was reported by 16% of centres.

The weighted average cost per patient completing a programme in 2000–2001 was £486 with 73% of this attributable to staff costs. This represents a total budget in England for cardiac rehabilitation of £12.5–19 million.

Discussion: If the goal of the National Service Framework to offer cardiac rehabilitation to 85% of patients is to be achieved referral must be increased and appropriate services provided. As centres report little capacity for increased provision within current programmes, extension of services may require extra resources. These will be dependent on local factors including current staffing, extension of the role of existing staff, and availability of facilities in hospital or community settings. Promotion of rehabilitation uptake by patients after referral should also be a priority.

Conclusions: The current level of provision for outpatient cardiac rehabilitation suggests that without any additional efforts and funding the National Service Framework goal of 85% referral with corresponding improvements in attendance is unlikely to be achieved.

ECONOMIC EVALUATION OF CHEST PAIN UNIT VERSUS ROUTINE CARE

S. Goodacre, J. Nicholl, S. Dixon, E. Cross, on behalf of the ESCAPE Research Team. *Medical Care Research Unit, University of Sheffield, UK*

Objective: To measure the cost effectiveness of chest pain unit (CPU) care compared with routine care for patients presenting to hospital with acute, undifferentiated chest pain.

Design: Cost effectiveness analysis alongside a cluster randomised controlled trial in which 442 days were randomised to CPU or routine care.

Setting: The Northern General Hospital, Sheffield.

Participants: 972 patients attending the emergency department with acute chest pain, undiagnosed by clinical assessment, electrocardiograph, and chest radiograph.

Main Outcome Measures: Health utility was measured using the EQ-5D questionnaire at two days, one month, and six months, and modelled with survival data to estimate quality adjusted life years (QALYs) gained by CPU care over six months. Costs over six months were measured from a health service perspective, using micro-costing by direct observation for the initial six hours of care, and gross-costing thereafter.

Results: CPU care was associated with a 17% reduction in admissions, from 54% to 37%, resulting in an estimated saving of 162 admissions per year. CPU care was associated with higher initial costs of care, but lower rates of outpatient follow up, outpatient investigation, emergency department reattendance, and hospital readmission. Overall, CPU care was associated with a saving of £53 per patient (95% CI –£88 to +£194, p=0.462) and a gain of 0.0143 QALYs (95% CI 0.0031 to 0.0255, p=0.012). If we are willing to pay £30 000 per QALY gained, CPU will provide a net benefit of £468 per patient (95% CI £138 to £852, p=0.008). Cost effectiveness acceptability curves show that CPU is likely to be cost effective for all values of willingness to pay for health gain.

Conclusion: CPU care is cost effective compared with routine care. It has the potential to improve emergency care and reduce costs throughout the NHS.

ECONOMIC ANALYSIS OF TREATMENTS CONTRIBUTING TO THE RECENT CORONARY HEART DISEASE MORTALITY DECLINE IN ENGLAND AND WALES

D. Fidan[1], B. Unal[2], J. Critchley[3], A. Miners[4], S. Capewell[2]. *[1]London School of Hygiene and Tropical Medicine, UK; [2]Department of Public Health, University of Liverpool, UK; [3]Liverpool School of Tropical Medicine, Liverpool, UK; [4]Health Economics Research Group, Brunel University, UK*

Introduction: Coronary heart disease (CHD) generates a massive burden of disease in the UK, affecting some 2.6 million patients and killing over 100 000 annually. UK mortality rates have halved since the 1980s, with at least a third of the fall attributable to medical and surgical treatments. However, annual NHS treatment costs are rising and now exceed £2 billion. Furthermore, the cost effectiveness of many cardiological treatments is unclear.

Objective: To examine the cost effectiveness of specific CHD treatments in England and Wales in 2000.

Methods: The previously validated IMPACT CHD model was used to calculate the number of life years gained (LYG) for specific cardiological interventions. This model combines data for England and Wales on the effectiveness of specific treatments and risk factor reductions, patient numbers, and the uptake and costs of specific interventions. The data sources included official statistics from Office for National Statistics, British Heart Foundation, Hospital Episode Statistics, clinical audits, and published meta-analyses of treatment efficacy. Financial sources included NHS Reference Costs, British National Formulary & Prescription Cost Analysis data, and published literature. Costs per LYG, stratified by age and sex, were generated for each specific intervention, and then examined using a sensitivity analysis.

Results: In 2000, medical and surgical treatments together prevented or postponed approximately 27 195 deaths, with approximately 165 159 LYG (minimum 127 740, maximum 192 000). Major contributions came from secondary prevention (47%), angina (30%), and hypertension (11%). Provisional results from the economic analysis suggest that the secondary prevention strategies are the most cost effective options, whereas the incremental cost effectiveness ratios (ICER) were higher for surgical interventions (such as CABG surgery and angioplasty). For example, for people aged 25–84, cost effectiveness of secondary prevention with statins was favourable, with a discounted ICER of around £2500 per LYG, whereas the ICERs for angioplasty for chronic angina and for CABG surgery were both above £25 000 per LYG. Other very cost effective strategies included aspirin for post-MI patients with an ICER of less than £1000 per LYG. Results remained relatively consistent across a wide range of values using sensitivity analyses.

Conclusions: Cost effectiveness was generally favourable for secondary prevention. Yet barely half these patients are receiving currently appropriate therapy. NHS resources are scarce. Yet substantial sums are being expended on costly interventions such as angioplasty and CABG surgery, with relatively poor returns. Furthermore, several published studies have consistently suggested that the most cost effective interventions are population based primary prevention, particularly diet and smoking. This merits debate.

Behavioural research

PROMOTING WALKING AND CYCLING AS AN ALTERNATIVE TO USING CARS: WHAT WORKS? A SYSTEMATIC REVIEW

D. Ogilvie, V. Hamilton, M. Petticrew, M. Egan. *MRC Social and Public Health Sciences Unit, University of Glasgow, UK*

Background: The choices people make about their mode of transport constitute an important determinant of population health. The growing use of the private car has resulted in traffic congestion and associated environmental problems that cannot be managed simply by building new roads. Transport policies therefore increasingly aim to reduce car use and promote alternative modes of transport. At the same time, increasing the population level of physical activity has been described as the "best buy" for improving public health. Promoting a population shift in transport patterns—a modal shift—from using cars towards walking and cycling could therefore help to meet cross-cutting health, transport, and environmental policy objectives. Promoting such a modal shift is now regularly advocated, but with little evidence of what interventions might be effective in achieving it.

Methods: We are conducting a systematic review of the evidence for the effectiveness of interventions in urban populations to promote a shift from using cars towards walking and cycling. We have included published and "grey" literature in any language using any type of research design. We aim to extend conventional systematic review methodology in two ways: by including and appraising a diverse range of evidence including case studies, and by seeking to understand the sociopolitical context of effective interventions. We are also seeking evidence to answer a series of secondary research questions concerning the social distribution of intervention effects, identifiable health benefits, and adverse effects.

Results and Discussion: We have identified a wide range of population—and area—based interventions from across the developed world involving measures to encourage walking and cycling ("carrots"), measures to discourage the use of cars ("sticks"), or combinations of the two. The interventions considered include engineering measures (traffic calming, road space reallocation, cycle paths); fiscal measures (charging for parking and road use); public transport improvements; urban planning measures; travel behaviour change programmes; and integrated urban transport strategies. In this paper we will summarise the best available evidence about the effectiveness of these interventions, review the contextual factors associated with effective interventions, and discuss some of the methodological issues in evidence synthesis in this interdisciplinary field.

ARE CHILDREN EATING MORE "HEALTHILY" AS THEY GET OLDER?

L. Glynn, I. Rogers, P. Emmett, and the ALSPAC Study Team. *Institute of Child Health, University of Bristol, Bristol, UK*

Objective: To investigate the changes in the diet of children as they grow up.

Design: A prospective cohort study. Diet was assessed when the children were 3 and 7 years old using a three day unweighed food diary.

Setting: A geographically defined area in southwest England.

Participants: 863 children at 3 years and 814 children at 7 years from the Children in Focus cohort, a sub-cohort of the Avon Longitudinal Study of Parents and Children (ALSPAC).

Main Outcome Measures: Fruit and vegetable intakes as a marker of a healthy diet. Savoury snack intake, confectionery intake, and percentages of energy from fat and sugar as markers of a less healthy diet.

Results: The mean intake of all foods was calculated for consumers only. At 7 years of age the children were not eating the recommended amount of fruit and vegetables, five portions/day. Mean total fruit and vegetable intake was 190.8 g/day. The children ate more fruit than vegetables, 138.6 g/day against 72.4 g/day. In comparison with intakes at 3 years the mean weight consumed increased (161.9 g/day against 190.8 g/day), however the mean weight consumed per unit of energy fell (28.9/MJ against 27.2/MJ). In addition, the proportion of children who ate fruit (excluding fruit juice) fell from 83% to 77% and the proportion that ate no fruit or vegetables (excluding pulses, baked beans, and fruit juice) rose from 4.6% to 5.9%. For savoury snacks mean intake rose by 5 g/day between 3 and 7 years (15.5 g/day against 20.6 g/day), the proportion consuming savoury snacks rose from 75% to 83%, and the proportion eating the equivalent of one bag or more of crisps/day (≥ 27g) rose from 11% at 3 years to 20.5% at 7 years. However, the mean weight consumed per unit energy was similar for each age group (2.7 g/MJ against 2.9 g/MJ). Chocolate and confectionery intake also rose by 5.4 g (21.1 g/day against 26.5 g/day) and the proportion of consumers of confectionery rose from 79.7% at 3 years to 84.9% at 7 years. Mean weight per energy unit is the same at both ages (3.7 g/MJ). The percentage energy from fat (37%; 35.6%) and sugar (25.3%; 25.0%) was similar at both ages.

Conclusion: From the four food groups investigated in this study the evidence was that the diets of these children were slightly less healthy at age 7 than at age 3, as reflected by the reduced proportion of children eating fruit and vegetables, and the increasing number consuming savoury snacks and confectionery.

"YOU CAN'T GO WITHOUT A FAG, YOU NEED IT FOR YOUR HASH"—SMOKING, CANNABIS, AND YOUNG PEOPLE

A. Amos[1], S. Wiltshire[1], Y. Bostock[2], S. Haw[3], A. McNeill[4]. [1]*Public Health Sciences, Edinburgh University, UK;* [2]*Bostock Consulting, Edinburgh, UK;* [3]*HEBS, Edinburgh,* [4]*Freelance Consultant, London, UK*

Background: The British government's intended reclassification in 2003 of cannabis down from a Class B to a Class C drug has stimulated debate about the likely effect on young people. However, there has been little consideration about the possible impact on young people's cigarette smoking. Indeed, there has been little research that has investigated how young smokers view cannabis use, how this relates to their own smoking behaviour, and the implications for policies and action on cannabis and tobacco. This presentation will draw on the findings of two qualitative studies carried out in Scotland that explored the relationship between smoking tobacco and cannabis use among teenage smokers.

Methods: One study used semi-structured paired interviews involving 99 16–19 year old smokers. The second study comprised 8 focus groups involving 44 15–16 year old smokers.

Findings: Cannabis use varied widely from never to daily use, with consumption highest among young men. Cannabis use was an important and enjoyable aspect of many of the young people's lives. It helped them relax, have fun, reduce stress, and some young men said it kept them off the streets and out of trouble. For many, cannabis use and cigarette smoking were inextricably interlinked. Several reported how smoking joints had been a "gateway" to smoking cigarettes. Although most wanted to quit smoking cigarettes, cannabis use reinforced their cigarette smoking and few wanted to stop using cannabis.

Conclusions: More attention needs to be focused on the relationship between smoking and cannabis use, and how to support young smokers who want to quit smoking but who also use cannabis. This has implications for policy, research, smoking cessation services, and smoking and drug health promotion aimed at young people.

RECENT TRENDS IN SEXUAL RISK BEHAVIOUR AMONG GAY MEN IN LONDON

J.P. Dodds[1], D.E. Mercey[1], J.V. Parry[3], A.M. Johnson[2]. [1]*Centre for Infectious Disease Epidemiology,* [2]*Departments of Sexually Transmitted Diseases,* [2]*Primary Care, and Population Sciences, Royal Free and University College Medical School, UK;* [3]*Sexually-Transmitted and Bloodborne Virus Laboratory, CPHL, UK*

Objective: To examine changes in sexual behaviour over time in a community sample of gay men in London and to explore links between sexual behaviour and HIV status (presumed and actual).

Design: A repeat cross sectional survey of men attending selected gay social venues or GUM (genitourinary medicine) clinics in London between 1996 and 2002. The survey was enhanced in 2000, with the introduction of unlinked anonymous saliva testing for anti-HIV antibody in the social venues.

Main Outcome Measures: Salivary anti-HIV antibody testing result and self reported behaviours including unprotected anal intercourse (UAI) and HIV status of UAI partners.

Results: Over 14 500 men were recruited between 1996 and 2002 (approximately 2000 annually), with an overall response rate of 76%. Since 1996 there has been a significant increase in any UAI and UAI with partners of a different or unknown HIV status. In 2000, 10.9% of the men were anti-HIV antibody positive compared to 11.5% in 2001. The anti-HIV positive men were more likely to report a sexually transmitted infection (STI) in the previous year and to have had one or more UAI partners of a different or unknown HIV status than the HIV negative men. Full results from the 2002 survey and comparisons will be presented.

Conclusions: Since 1996 there has been a significant increase in the proportion of men reporting UAI with partners of a different or unknown HIV status. HIV positive and negative men continue to report high risk sexual behaviour. The high HIV prevalence in this group, increasing STI incidence, and reported high sexual risk behaviours indicate the potential for future growth of the HIV epidemic in gay men.

CONDUCTING BEHAVIOURAL RESEARCH USING THE INTERNET: A COMPARISON OF ONLINE AND OFFLINE SAMPLES OF GAY/BISEXUAL MEN

J. Elford[1], G. Bolding[1], M. Davis[1], L. Sherr[2], G. Hart[3]. [1]*City University London, Institute of Health Sciences & St Bartholomew School of Nursing and Midwifery, UK;* [2]*Royal Free and University College Medical School, London, UK;* [3]*MRC Social and Public Health Sciences Unit, Glasgow, UK*

Objectives: A growing number of researchers have begun to collect behavioural data using the internet since this approach has the potential of accessing hard to reach groups. The objective of this investigation was to compare the demographic, social, and behavioural characteristics of two samples of London gay/bisexual men, one surveyed online, the other offline.

Methods: In February to March 2002, 879 London gay/bisexual men completed a self administered pen and paper questionnaire distributed in central London gyms (offline sample). In May to June 2002, 1218 London gay/bisexual men completed a self administered questionnaire online, accessed through internet chatrooms and profiles on gaydar and gay.com.

Results: Compared with men surveyed offline, those surveyed online were significantly less likely to only have sex with men (89% *v* 94%), to describe themselves as gay (89% *v* 95%), to be in a relationship with a man (44% *v* 52%), or to have been tested for HIV (68% *v* 80%) ($p < 0.001$). Men recruited online were also younger (33 *v* 35 years) and less likely to have had a higher education (67% *v* 79%) ($p < 0.001$). However, differences between online and offline samples were less pronounced for HIV positive men and more pronounced for HIV negative men and those who had never been tested for HIV. Regardless of HIV status, men recruited online were more likely to report high risk sexual behaviour (ie unprotected anal intercourse with a partner of unknown or discordant HIV status) than men surveyed offline (32% *v* 22%, $p < 0.001$). Men recruited online were also significantly more likely to have used the internet to look for sex (85% *v* 45%, $p < 0.001$); for HIV positive and negative men, seeking sex on the internet was associated with high risk sexual behaviour ($p < 0.01$). In multivariate analysis, being surveyed online was independently associated with high risk sexual behaviour for HIV negative and never tested men (adjusted odds ratio for online *v* offline samples: HIV negative men, 1.73, 95% CI 1.23 to 2.42, $p < 0.01$; never tested men, 2.45, 95% CI 1.39 to 4.29, $p < 0.01$). This was not the case for HIV positive men.

Conclusion: The internet offers valuable opportunities for conducting behavioural research among gay/bisexual men because it reaches some men who may not be easily accessed in the community yet who are at high risk for HIV and STDs. For this reason, the internet's potential for HIV prevention also merits exploration.

Methods II

ANALYSIS OF CHANGE WITH RESPECT TO BASELINE IS ERRONEOUS USING STANDARD CORRELATION/ REGRESSION: DO WE REALISE HOW MANY OTHER STUDIES ARE STATISTICALLY INVALID DUE TO MATHEMATICAL COUPLING?

A. Blance[1], M.S. Gilthorpe[1], Y.-K. Tu[1], V. Clerehugh[2]. [1]*Biostatistics Unit, Academic Unit of Epidemiology, School of Medicine;* [2]*Leeds Dental Institute, University of Leeds, Leeds*

Introduction: Previous studies, using correlation/regression analysis, show that treatment effects measured by changes in a clinical

parameter are often associated with baseline values of that parameter. However, these studies have a methodological weakness: correlation/regression between baseline measures and the derived change variable invalidates the statistical procedures of testing the null hypothesis, that is that the coefficient of correlation/regression is zero. This is due to mathematical coupling (MC), which distorts and violates basic assumptions underpinning correlation/regression. Some statisticians continue to confuse this issue with that of regression to the mean (RTM), which is where, due to measurement error or within subject variation, initially high values are subsequently recorded to be lower and visa versa. However, RTM is a special case of MC, where coupling occurs through the measurement errors, and one may often experience MC without RTM.

Objectives: To introduce MC, distinguish it from RTM; demonstrate how MC can yield misleading results by drawing upon examples from the dental literature; summarise findings from simulations; and highlight alternative analytical strategies, contrasting these to current standard (erroneous) practices.

Methods: Original data were extracted from articles on Guided Tissue Regeneration (GTR) where they contained all information on the clinical outcomes of pocket probing depth and/or cumulative attachment loss, and where correlation or regression was used to evaluate prognostic factors such as baseline disease severity. The relationship between clinical outcomes and baseline measurements were re-analysed using Oldham's correlation method and random coefficient multilevel models.

Results: Although several GTR studies indicated a strong relationship between baseline disease severity and treatment effect when (erroneously) analysed ignoring MC, the observed effects were considerably reduced, became negligible, or occasionally reversed after appropriate analytical strategies were adopted. In the absence of other covariates, Oldham's method to analyse change with respect to baseline was simple, although random coefficient multilevel models provided a more flexible approach for the simultaneous inclusion of additional covariates.

Conclusions: Many studies that investigate change in relation to baseline do so incorrectly. Not well known among statisticians, it is not surprising that the MC phenomenon is little known among epidemiologists, yet its ramifications are enormous because the problems it generates are not limited to the example of analysing change against baseline. MC thus needs to be more widely known and understood by all those who employ regression methodology within clinical research.

INAPPROPRIATE AND INDETERMINATE USE OF THE ODDS RATIO: PREVALENCE IN FOUR MAJOR GENERAL JOURNALS

K. Steel[1], R. Bhopal[2], R. Prescott[2]. [1]*Infectious Disease Research Network, Department of Primary Care & Population Sciences, University College London, London, UK;* [2]*Public Health Sciences Section, University of Edinburgh Medical School, Edinburgh, UK*

Background: The odds ratio, dependent upon whether incident and/or prevalent cases are enrolled, upon rarity and/or other assumptions, and, in case referent studies, upon the control sampling scheme, may be used to estimate, or calculate directly, the risk ratio, rate ratio, or prevalence ratio.

Objective: To assess the current practice of authors regarding use of the odds ratio as an estimate of effect size.

Design: Critical review of a random sample of year 2000 original articles containing relative effect measures, stratified by journal.

Data Sources: The *BMJ*, *Lancet*, *JAMA*, and *New England Journal of Medicine*.

Review Methods: Odds ratios being interpreted in terms of risk when the numerical discrepancy between odds ratio and risk ratio (or prevalence ratio) was >20% was classified as inappropriate use. Indeterminate use involved: unsupported interpretations, that is odds ratio interpreted in terms of risk without sufficient information being given for the validity of that interpretation to be established; odds ratios being potentially misleading to the general reader, that is odds ratio presented is >20% discrepant from the (not presented) risk ratio or prevalence ratio; odds ratios reported with insufficient information given to enable calculation of the discrepancy.

Main Outcome Measures: Prevalence of inappropriate and of indeterminate use of the odds ratio.

Results: 332/871 original articles (38%) reported relative effect measures. Of 175 articles randomly selected (from the 332) and reviewed, 94 calculated odds ratios. Inappropriate use was found in 4/94 (4.3%, 95% CI 1.2% to 10.5%) and indeterminate in 39/94 (41%, 95% CI 31% to 51%).

Conclusion: Although most authors have received the message that odds ratios may not always be interpreted in terms of risk, many leave unqualified odds ratios that give an exaggerated impression of effect size to an unwary reader or that are ambiguous—regarding effect size—to an astute one. To contribute to the current call for greater transparency in research results, authors should convert main outcome odds ratios to another effect measure (unless the outcome incidence or prevalence is < 10% and the odds ratio between 0.5 and 2.5) by formulaic means for communication purposes or explicitly state that the odds ratio is being used to show association only. For case referent studies clear statements as to the control sampling scheme, whether incident and/or prevalent cases are involved and, if relevant, why the rarity assumption is believed to hold, are needed.

ELECTRONIC LITERATURE SEARCHING FOR SYSTEMATIC REVIEW OF QUALITATIVE LITERATURE

R.L. Shaw[1], A. Booth[2], A.J. Sutton[1], M. Dixon-Woods[1], D.R. Jones[1], T. Miller[3], J.A. Smith[4], B. Young[5]. [1]*Department of Epidemiology and Public Health, University of Leicester, UK;* [2]*ScHARR, University of Sheffield, UK;* [3]*Department of Sociology, Oxford Brookes University, UK;* [4]*Department of Psychology, Birkbeck College London, UK;* [5] *Department of Psychology, University of Hull, UK*

Background: Efforts to incorporate qualitative research in systematic reviews are hampered by significant difficulties in searching for and identifying qualitative research. Little is known about the effects of different search strategies on searching outcomes, posing problems for those who wish to demonstrate the systematic and reproducible characteristics of their qualitative literature searches.

Objectives: We aimed to determine the efficiency and yield of three electronic search strategies for qualitative research in the area of breastfeeding using six electronic databases.

Methodology: We evaluated three strategies: (1) subject headings, using index terms specific to each database; (2) free text/natural language, using qualitative research authors and methodology terms; and (3) broad based, using the generic terms "qualitative", "findings", and "interviews". A citation search of qualitative research authors is also underway. Searches were conducted on Medline, Embase, Cinahl, British Nursing Index (BNI), ASSIA, and Social Sciences Citation Index (SSCI) to cover three disciplinary areas: medicine, nursing, and the social sciences. Once searching was complete, reference abstracts were screened by experienced qualitative researchers. Those which screened positive for breastfeeding and qualitative research became candidate studies for the review.

Results: A total of 7420 references was identified by all strategies. The strategy that identified most of these was strategy 3, yielding 3912, of which 2374 were not identified by any other strategy; strategy 1 identified 3537 references, of which 1247 were not identified elsewhere; the respective results for strategy 2 were 3451 and 1205. Of the total, 587 references screened positive for methodology and topic. Of these, 463 were identified by strategy 1 and 151 were identified only by strategy 1. Strategy 3 identified 359 references, of which 68 were identified only by strategy 3. The respective results for strategy 2 were 315 and 28.

Discussion: The subject headings (strategy 1) and broad based (strategy 3) searches yielded most references overall; the free text (strategy 2) search was less efficient and effective. These findings indicate that search strategy type is fundamental to literature searching for qualitative evidence and failure to recognise its impact could result in the identification of bodies of literature that are not comprehensive, causing distorting effects in any synthesis. Moreover, the majority (85%) of references identified by the strategies did not qualify as relevant according to topic and/or methodology. This suggests poor precision in indexing. Electronic databases therefore need to develop subject headings designed specifically to retrieve qualitative literature.

IN THE EYES OF THE BEHOLDER: THE SOCIAL CONSTRUCTION OF GENDER IN PUBLIC HEALTH

C. Mae, J. Coreil. *Department of Community and Family Health, College of Public Health, University of South Florida, USA*

Gender is one of the most commonly studied determinants of health. Critiques of the "risk factor" approach to public health research assume gender is treated as an atheoretical variable, and often used as a proxy for sex. However, conceptualisations of gender in public health draw upon diverse theoretical orientations. This paper seeks to broaden the understanding of the role of gender in public health by demonstrating that, as a socially constructed variable, it is shaped by not only by the social environment in which it is studied, but also the

nomological positioning of gender by the researcher. The paper will review several theoretical orientations, such as critical/structural, systems/ecological, postmodern, biological/medical, and psychosocial frameworks to demonstrate the effect of various "lenses of understanding" on constructing gender. A theory from each perspective will be applied to the gender analysis. Examples for each theory's application will be drawn from some of the more pressing issues in gender in public health, such as the gender gap, utilisation of services, and infectious disease. A descriptive typology will be presented that may serve as an organising tool when envisioning this social determinant of health. The progress of scientific inquiry using gender is contingent upon the awareness, utilisation, and development of theory.

DETECTING SIMILARITIES IN THE SPATIAL DISTRIBUTION OF CHILDHOOD LEUKAEMIA AND TYPE 1 DIABETES IN YORKSHIRE USING BAYESIAN SMOOTHING

S.O.M. Manda[1], R.G. Feltbower[2], R.C. Parslow[2]. [1]*Biostatistics Unit, University of Leeds, UK;* [2]*Paediatric Epidemiology Group, University of Leeds*

Background: Ecological analyses have shown that both childhood acute lymphoblastic leukaemia (ALL) and type 1 diabetes mellitus display variation between smaller geographical units. Spatial explanatory factors associated with the variation for each disease include affluence, population density, and population mixing.

Objectives: Firstly, to investigate whether factors related to incidence of childhood diabetes are similar to those associated with the occurrence of ALL across small geographical areas; secondly, to determine whether the estimated relative risks follow the same geographical pattern across Yorkshire; and thirdly, to see whether the incidence of one disease is associated with that of the other.

Methods: Information on patients aged 0–14 years were derived from two co-terminus population based registers of childhood ALL and type 1 diabetes covering the Yorkshire region and diagnosed between 1986–1998. Patients' were assigned to an electoral ward (EW) using their validated postcode at the time of diagnosis. Counts for each condition were then aggregated across the 532 EW in existence at the time of the 1991 Census. Standardised incidence ratios (SIRs) were calculated based on 1991 census populations; and we also obtained measures for area based population density, deprivation, population mixing, and ethnic group. Bayesian smoothed estimates of correlated and non-correlated spatial SIRs were obtained for each disease count separately. For the analysis of cross association between diseases, simple correlation and adding the other crude SIR as a covariate into the model were used.

Results: Population mixing and deprivation showed an association with the incidence of both diseases. Areas with high levels of population mixing or more deprived had lower rates of ALL and diabetes and vice versa. Both diseases were also negatively associated with ethnicity. However, no appreciable association was found for population density. Using the SIR of one disease as a predictor in the regression model of the other, each coefficient was significant after controlling for the spatial explanatory variables.

Conclusions: Yorkshire is unique in the UK in having two high quality disease registers for type I diabetes and leukaemia, providing an opportunity to assess the similarities in their spatial epidemiology. Using Bayesian smoothing, we have demonstrated that childhood ALL and diabetes both show a similar inverse association with both population mixing and deprivation across small areas. Both factors may indirectly measure exposure to infections across areas. Several studies have shown that exposure to a sufficient number and variety of infections may protect against the development of ALL and diabetes.

HSR II

ROUTINE EXAMINATION OF THE NEWBORN: THE EMREN TRIAL (AN RCT EVALUATION OF THE EXTENSION OF THE MIDWIFE ROLE)

J. Townsend[1], D. Wolke[2], J. Hayes[1], S. Dave[1], C. Rogers[3], L. Bloomfield[1], E. Quist-Therson[4], M. Tomlin[3], D. Messer[2]. [1]*Centre for Research in Primary and Community Care, University of Hertfordshire, Hatfield, UK;* [2]*Department of Psychology, University of Hertfordshire, Hatfield, UK;* [3]*Department of Midwifery, University of Hertfordshire, Hatfield, UK;* [4]*West Hertfordshire Hospitals Trust, Watford, UK*

Objectives: To assess the implications and cost effectiveness of midwives examining the healthy newborn, and of a repeat examination at 10 days.

Design: Randomised controlled trial with newborns randomised to SHO or midwife for examination; all midwives and SHOs assessed using videotapes rated by independent consultant and senior midwife; interviews with health professionals and mothers; National Survey of current practice; consultations with representatives of professional bodies; cost assessment.

Setting: DGH; London Teaching Hospital; general practices; mothers' homes; questionnaires to all maternity units.

Subjects: 826 mother/baby dyads in DGH, who fitted inclusion criteria for examination by midwife; all midwives and junior doctors examining during research period.

Interventions: Routine newborn examination and further examination at 10 days.

Outcome Variables: Maternal satisfaction after examination and at three months; referrals assessed as appropriate/major or minor, by three independent consultants; problems during first year assessed as identifiable at 24 hours; assessment by video examination.

Results: No statistical difference in appropriate referral rates between SHO and midwives; no significant differences between the groups in identification at examination of problems occurring in first year of life. Where significant quality differences were identified by video, all were rated as carried out more appropriately by the midwives. Major differences for: examination of the heart and lungs; overall quality of the examination; and communication skills. Overall quality of the physical examination by midwives was rated as good or very good by the midwife raters for 73% of the examinations and by paediatric consultants raters for 23%. Corresponding figures for SHO examinations were 12% and 0%. 81% of mothers were satisfied or very satisfied with the examination. Mothers were more satisfied when a midwife examined. Discussion of health care issues and continuity of care were significantly related to higher satisfaction; midwives were significantly more likely to discuss healthcare issues (61% *v* 33%), and could provide continuity of care. After controlling for these factors and history of miscarriage, maternal satisfaction was no longer significantly related to randomised group. Few new health problems were identified at the extra 10 day examination.

Costs: There were some net costs to midwifery departments and savings to paediatric departments for the scenarios suggested by the professional organisations, but no major economic implications.

Conclusion: All component aspects of the study were consistent in showing benefits, or no significant barriers, to suitably qualified trained midwives carrying out the examinations; currently midwives examine only 2% of babies.

A REVIEW OF TRIALS OF COMPLEX HEALTH CARE INTERVENTIONS

E. Sanford[1], S.T. Brookes[1], S. Ebrahim[1]. [1]*Department of Social Medicine, University of Bristol, Bristol, UK;* [2]*MRC Health Services Research Collaboration, Department of Social Medicine, University of Bristol, Bristol, UK*

Objective: The randomised controlled trial has emerged as the "gold standard" in terms of evaluating the effectiveness of interventions in health services research. Many trials evaluate the effects of a single "simple" intervention such as a drug or non-pharmacological intervention such as surgery. However, many healthcare interventions are more complex, consisting of several separate components (for example, specialist stroke units). The complexity of the intervention itself will generally mean that its design, development, and evaluation will also be highly complex. This study reviews the evaluation and reporting of randomised controlled trials of complex interventions.

Methods: Each issue of the *Annals of Internal Medicine*, *BMJ*, *JAMA*, *Lancet*, and *New England Journal of Medicine* during September 2000 to August 2001 was hand searched for reports of randomised controlled trials of health care interventions. All trials of complex interventions were independently assessed by two authors for details of design and evaluation.

Results: 300 trials were identified, 65% evaluated drug interventions, 21% simple non-pharmacological interventions, and only 14% complex interventions. This pattern was consistent within each journal with the exception of the *BMJ*, for which nearly half of the randomised trials focused on complex intervention packages. The majority of packages appeared to be based on empirical evidence rather than a theoretical base. There was little attempt to properly define individual components and their interrelationships—only 11% reported initial case studies, qualitative research, or modelling. In addition, only 21% performed exploratory or pilot studies to determine optimal therapy and test for learning curves. Another deficiency was the lack of setting acceptable limits of individualisation of treatment, defined concisely in only 10% of reports; many simply providing statements such as "treatment was tailored to individual needs".

Conclusion: There appears to be a lack of published trials of complex health care interventions. Replication is seriously hampered by ill defined interventions and limits of individualisation. Little attempt is made at determining the separate components and their individual effectiveness, which has serious implications for limited health service resources.

TEAMWORK AND SAFETY ATTITUDES AMONG STAFF IN CRITICAL CARE UNITS AND THE RELATIONSHIP TO PATIENT MORTALITY

K. Rowan[1], T. Brady[1], K. Vella[1], J. Boyden[2], B. Sexton[3]. *[1]ICNARC, London, UK; [2]Royal Cornwall Hospital, UK; [3]Human Factors Research Group, University of Texas, USA*

Introduction: In 2002, Borrill *et al* reported a direct and strong association between the quality of human resource practices and patient mortality in the NHS—higher levels of staff teamworking, training, development, and appraisals were associated with lower patient mortality. The objectives of this study were to elicit teamwork and safety attitudes among staff in critical care units and to investigate whether these attitudes were related to case mix adjusted outcomes for patients.

Methods: The Safety Attitudes Questionnaire (SAQ) is a valid, reliable questionnaire that elicits caregiver attitudes for six factors: teamwork climate; safety climate; job satisfaction; working conditions; stress recognition; and perceptions of management. Staff received a sealed envelope containing a copy of the SAQ, a cover letter, a pencil, and a freepost (direct to ICNARC) return envelope. Absolute confidentiality was maintained on questionnaires with the sole identifiers being site code and job category. Permission to link staff attitudes data to patient case mix and outcome data was sought from the director. The outcome variable was hospital mortality. The relationship between patient mortality and staff attitudes was investigated in a hierarchical logistic regression model after adjustment for case mix.

Results: A total of 106 units participated in the survey, approximately 43% nationally. The mean number of staff was 69.8 (range 21–142). Staff response rate was 67.5%, ranging 30.0% to 95.5% across units. Of 4859 respondents, positive attitudes were highest for safety climate (40.4%), teamwork climate (35.0%), job satisfaction (31.9%), and working conditions (22.3%), and lower for stress recognition and perceptions of management, 12.1% and 9.7%, respectively. There was significant variation for all six factors across units. Overall, 14 064 (19.8%) admissions died in the unit and 21 254 (29.9%) admissions died before ultimate discharge from hospital. Ultimate hospital mortality varied between 16.7% and 54.9% across units. Hospital mortality was not associated with the percentage of staff positive within any domains of the SAQ either before or after adjustment for case mix. Similar results were obtained for critical care unit mortality.

Discussion: Contrary to the results reported by Borrill *et al*, and despite wide variation in staff attitudes, negative attitudes were not associated with poorer, risk adjusted patient outcome in critical care.

CONSENSUS METHODS TO DEVELOP GUIDELINES FOR ROUTINE PREOPERATIVE TESTING. LIMITATIONS OF THE METHOD

J. Langham, B. Reeves, on behalf of the NCCAC Guideline Development Group for Preoperative testing. *National Collaborating Centre for Acute Care, London and London School of Hygiene and Tropical Medicine, UK*

Background: The clinical "value" of routinely testing healthy individuals before an operation is uncertain and literature reviews have demonstrated that the evidence is extremely poor. Consequently we used consensus methods in order to produce guidelines to help decision making and reduce areas of uncertainty and variation in practice.

Methods: A modified nominal group technique (RAND) was used. The consensus focused on the appropriateness of preoperative testing in (a) healthy children and adults, and (b) adults with comorbidity (cardiovascular, respiratory, and renal disease), varying by age and type of surgery. Panellists (representatives from key healthcare professions), were sent the consensus questionnaire and a short summary of the evidence and asked to rate their agreement with the statements (representing their personal opinion about "best practice") using a 1 to 9 scale. Panellists then met for a day to discuss the questions and re-rate each question after their discussion.

Results: Four multidisciplinary groups were assembled (two for each phase, a and b. Ratings from the meetings were collated and analysed to produce three answer categories: (1) agreement that the test is appropriate; (2) agreement that the test is not appropriate; and (3) uncertainty about the value of the test, which may depend on specific patient characteristics. There were some areas where consensus was reached (eg about when or when not to do a chest *x* ray) and others where, even after discussion, there were strong differences of opinion (eg disagreements about the relative merits of urine dip stick testing and a random blood glucose).

Conclusions: For all the strengths of the consensus process, there are limitations. There is a danger that agreement between panellists reflects the status quo, rather than an explicit weighing up of the benefits, harms, and costs of testing or not. There are difficulties in interpreting a lack of consensus. In some cases, panellists found it hard to generalise to a group of patients, as there are inevitably exceptions to the rule. In other cases the literature was unable to provide evidence to fill knowledge gaps such as the diagnostic accuracy of tests in different patient groups. This may have led to panellists drawing more or less heavily on their own experience, inevitably producing varied responses and disagreements. Nevertheless, the consensus method has successfully produced a first version of guidelines, which are acceptable to clinicians and which can be developed in the future with new evidence from research and audit.

DOES HOSPITAL ORGANISATIONAL CULTURE INFLUENCE HOSPITAL PERFORMANCE?

H.T.O. Davies[1], R. Mannion[2], R. Jacobs[2], A.E. Powell[1], M.N. Marshall[3]. *[1]Centre for Public Policy & Management, University of St Andrews, Scotland, UK; [2]Centre for Health Economics, University of York, UK; [3]National Primary Care R&D Centre, University of Manchester, UK*

Research Objective: Organisational culture change has widely been seen as one means of improving healthcare performance. Yet the empirical evidence so far linking culture to performance is limited. Our objective was to examine the relationship(s) between senior management team culture and acute hospital performance in the English NHS.

Study Design: We examined quantitative associations between senior management team culture and hospital performance in a large sample (n=197) of acute NHS trusts. A national postal survey was used to assess senior management team culture, using an instrument adapted from the Competing Values Framework (CVF). The CVF provides a culture typology that classifies culture as a balance between four cultural archetypes: clan, developmental, hierarchical, or rational cultures. The hospital based culture assessments were combined with a large routinely collected dataset on various aspects of organisational performance. Associations between measures of culture and measures of performance were explored using multivariate econometric analyses, including regressions, ANOVA, multinomial logit, and ordered probit.

Population Studied: 899 individuals provided data on senior management team culture (response rate: 60%); these provided at least three points of reference for 170 hospital organisations (86% of those contacted).

Principal Findings: Over half the organisations (54%) had a dominant clan culture at senior management level; 29% had a dominant rational culture; 11% were assessed as developmental; and just 6% emerged as being primarily hierarchical. Multivariate modelling confirmed the hypothesis that organisational culture is related to performance in a contingent manner, that is those aspects of performance valued within the dominant culture are those aspects on which the organisation excels. For example, organisations with hierarchical cultures were more likely to perform well in terms of patient waiting times; those with clan cultures scored better on staff satisfaction; and organisations with developmental cultures were least likely to be awarded poor "star ratings".

Conclusions: This study provides important new evidence that different organisational culture types may be more or less able to perform, depending on those aspects of performance that are valued within that culture. Thus these findings clearly suggest that organisational culture matters in the delivery of high performance in health care; they even go some way towards suggesting which sorts of cultures might be expected to enhance which aspects of performance.

Mental health

META-ANALYSIS OF THE EFFICACY AND TOLERABILITY OF SELECTIVE SEROTONIN REUPTAKE INHIBITORS COMPARED WITH TRICYCLIC ANTIDEPRESSANTS IN PRIMARY CARE TREATED DEPRESSION

S. Macgillivray[1], B. Arroll[2], F. Sullivan[3], I .Reid[4], S. Ogston[1], B. Williams[1], I. Crombie[1]. [1]*Department of Epidemiology and Public Health, University of Dundee, Dundee, UK;* [2]*Department of General Practice and Primary Health Care, University of Auckland, Auckland, New Zealand;* [3]*Tayside Centre for General Practice, University of Dundee, Dundee, UK;* [4]*Department of Psychiatry, University of Dundee, Dundee, UK*

Objective: To compare the efficacy and tolerability of tricyclic antidepressants (TCAs) compared with selective serotonin reuptake inhibitors (SSRIs) in the treatment of depressive disorders in primary care patients.

Design: Systematic review and meta-analysis of randomised controlled trials.

Main Outcome Measures: Standardised weighted mean difference of final mean depression scores and relative risk of response using the clinical global impression (improvement) score. Relative risk of withdrawing from treatment at any time, and the number withdrawing due to side effects.

Results: 11 studies (2951 participants) compared an SSRI with a tricyclic. There were no significant differences in efficacy between SSRIs and tricyclics (SMD, fixed effects 0.05 (95% CI –0.02 to 0.13; z=1.34 p <0.18). Significantly more patients receiving a tricyclic withdraw from treatment for any reason (RR 0.77 (95% CI 0.67 to 0.89, z=3.59 p <0.0003), and withdraw from treatment specifically because of side effects (RR 0.70 (95% CI 0.58 to 0.85, z=3.62 p <0.0003). The majority of studies included in the review were small and were supported by commercial funding. Many studies were of low methodological quality and/or did not present adequate data for analysis. Nearly all studies were of short duration typically 6–8 weeks and rarely used any quality of life measures.

Conclusion: The evidence on the relative efficacy of SSRIs and TCAs in primary care is sparse, of variable quality, and many fundamental gaps in the literature exist. Available data suggest equal efficacy. SSRIs are significantly better tolerated than TCAs by primary care patients and SSRIs may be better tolerated by primary care patients than secondary care patients. Study setting is likely to be an important factor in assessing the efficacy and tolerability of antidepressant treatment.

SHOULD WE SCREEN FOR DEPRESSION AND ANXIETY? A SYSTEMATIC REVIEW

S.M. Gilbody[1], A.O. House[1], T.A. Sheldon[2]. [1]*Academic Unit of Psychiatry, University of Leeds, UK;* [2]*University of York, UK*

Background: Mental health problems, such as anxiety and depression, often go unrecognised in primary care and in the general hospital. Unrecognised depression and anxiety are associated with increased and inappropriate utilisation of health resources and poor outcome. The routine administration of mood questionnaires as a screening strategy has been advocated as a simple, quick, cheap, and effective adjunct to primary care and hospital consultation.

Objectives: To examine the effect of routinely administered psychiatric questionnaires, such as the General Health Questionnaire (GHQ), on the recognition, management, and outcome of mental health problems in non-psychiatric settings.

Methods: A systematic review and meta-analysis of RCTs of the administration and routine feedback of psychiatric screening questionnaires to non-specialist clinicians.

Main Outcome Measures: Recognition of mental health problems following feedback of questionnaire results; interventions for mental health problems; outcome of mental health problems.

Results: Sixteen studies compared the effect of the administration of these instruments followed by the feedback of their results to clinicians, to administration with no feedback. Routine administration and feedback of scores for all patients (irrespective of score) did not increase the overall rate of recognition of mental health problems such as anxiety and depression (R =0.96 95%CI 0.83 to 1.10). There is some suggestion from two studies that routine administration followed by selective feedback for only high scorers did increase the rate of recognition of depression (RR=2.64, 95%CI 1.62 to 4.31). However, this increased recognition did not translate into an increased rate of intervention. Overall, studies of routine administration of psychiatric measures did not show an effect on eventual patient outcome.

Conclusions: Routine outcome measurement is a costly exercise and there is no evidence to suggest that it is of benefit in improving psychosocial outcomes of patients with common mental health problems managed in non-psychiatric settings. Effective strategies are likely to be more complex interventions, including clinician education and guideline implementation strategies.

SEX DIFFERENCES IN MENTAL HEALTH OF SURVIVING PARTNER FOLLOWING THE DEATH OF SPOUSE

D. Boniface[1], J. Thomson[2]. [1]*Department of Epidemiology and Public Health, University College London, London, UK;* [2]*Glaxo-SmithKlein, Stevenage, UK*

Introduction: Previous research has shown that death of a spouse has important implications for mental health of the surviving partner. Studies in the USA and Australia suggest that its effects on general mental health, depression, and suicide are greater in men. We explore this in a large British cohort study through measures of general mental distress, GHQ, living alone, time since bereavement, and cause of death.

Method: A cohort of randomly selected men and women, interviewed in their own homes in 1984–85 and re-interviewed in 1991–92, was monitored subsequently for deaths through ONS for 17 years. The sample was randomly selected from households in Great Britain. The interview covered social, psychological and physical health, behaviours, and sociodemographic details.

Results: Among the 9003 participants aged 18 years and above, 12% of women and 4% of men reported the death of their spouse. In those aged 75 years and over it was reported in 57% of women and 30% of men. For widowed males the rate of poor mental health symptoms was 42.5% compared with 26.0% in other men (p=0.000) and the corresponding rates for females were 36.4% and 32.8% (p=0.182). When males and females who had experienced the death more than 5 years previously were excluded, the rates became 43.5% for males and 47.2% for females (p=0.000 for both). Five or more years after bereavement, women's GHQ status resembled that of women who had not been widowed, whereas men's GHQ status resembled that of men who had been widowed within the previous 5 years. This difference between the trends for males and females was statistically significant (p=0.027) in a logistic regression model adjusting for age and social class. Men who had been bereaved between the two interviews were more likely than women to report worsened psychological symptoms (p=0.020) or loneliness (p=0.023). No sex differences in relation to widowhood were found in the numbers of deaths due to accidents and suicide after allowing for age. Living alone interacted with widowhood in its effect on psychological distress.

Conclusions: These findings raise concerns regarding the consequences of widowhood that are of increasing importance in view of recent changes in life expectancy and household size.

SOCIOECONOMIC CHANGE AND SUICIDE: A TIME SERIES STUDY OF IRELAND

S. Lucey[1], P. Corcoran[2], I. Perry[3]. [1]*Department of Economics, University College Cork;* [2]*National Suicide Research Foundation, Cork;* [3]*Department of Epidemiology and Public Health, University College Cork*

Objective: This work tested the hypothesis that socioeconomic change contributed to the rise in the Irish suicide rates in recent decades.

Methods: Official suicide (ICD-9 E950–959) and undetermined death (ICD-9 E980–989) mortality data were obtained from the Irish Central Statistics Office for the years 1968–2000. Data relating to the economic and social variables (per capita GDP, unemployment rate, female labour force participation rate, per capita alcohol expenditure, marriage rate, percentage of births outside of marriage, and the indictable crime rate) were obtained from relevant sources. Incidence rates were detailed using age standardised and age specific rates. The effects of the economic and social variables on the Irish suicide rates were examined using robust time trend analysis with first differencing employed to reduce the data series to stationarity.

Results: Ordinary least squares regression equations explained over 85% of the variation in total, male, female, and male 15–34 years suicide rates. However, analysis of the first differenced data showed that the significant regression models for the total and male suicide rates were a consequence of the non-stationarity of the data. Only the indictable crime rate had a significant independent effect on

the female suicide rate (coefficient=2.0, p <0.01), while the indictable crime rate (coefficient=1.7, p<0.05) and per capita alcohol expenditure (coefficient=3.7, p<0.001) had significant independent effects on the male 15–34 years suicide rate. Thus, on average, a 1% increase in indictable crime and per capita alcohol expenditure led to 1.7% and 3.7% increases in the Irish male 15–34 years suicide rate over the study period.

Conclusion: These findings are consistent with the hypothesis that increasing alcohol consumption has been a significant factor in the rise in suicide mortality rates in young males observed in Ireland.

WAR TRAUMA, PHYSICAL, AND PSYCHOLOGICAL INJURY—COPING STRATEGIES AND PROSPECTS FOR REHABILITATION AMONG LEBANESE AND PALESTINIAN POPULATIONS

A. Sibai[1], L. Measey[2], M. Baydoun[1], K. Sen[3]. *[1]AUB, Beirut, Lebanon, [2]Coventry Health Authority, [3]University of Cambridge Department of Public Health*

Background: Lebanon is a country that has been ravaged by war and atrocities for more than two decades (1975–1996). As part of a larger study to propose a coherent strategy for primary and secondary prevention of disabilities in Lebanon, an in depth semi structured study was conducted to document the quality of life of subjects who were exposed to war related events or injuries. The objectives were to assess coping strategies among Lebanese and Palestinian adults and assess the levels of social integration and the possible effects of socioeconomic status in improving mental well being and ability to survive.

Methods: Subjects from both Lebanese and Palestinian communities were selected having two types of exposure. The first group (n=21) consisted of disabled subjects who reported "war related injury" as being the direct cause of disability. The second exposure group (n=20) included those who reported having experienced an event related to the war in Lebanon such as massacres, death of a family member, or being kidnapped and tortured, without being injured or physically disabled. For comparative purposes a control group not suffering from either was also selected (n=19 study subjects included a balanced representation of sex and nationality among Lebanese and Palestinian subjects). Mental wellbeing outcomes, namely depression and post traumatic stress disorder (PTSD) were measured using GHQ-12 screening instrument and DSM-IV criteria, respectively. Thus a total of 60 semi-structured interviews were conducted and transcribed into individual case studies as well as quantitative data.

Results: Results suggest more than three quarters of the sample group were suffering from depression. The condition was more prevalent among Palestinians than Lebanese, where just over half were in a similar condition. No clear differentials were noted across exposure groups especially since the status of control was problematic with whole populations having been exposed especially so among Palestinians. In general both outcomes increased with age, inadequate social support, low socioeconomic status, and poor health perception. The study found that the Palestinian population had better coping strategies than the majority of Lebanese, despite being at the frontline of the war offensive wherein social and economic fracture and dislocation was much greater among this group. Having a belief system and a sense of collective rather than individual loss appears to have enabled the Palestinian group to cope better. The Lebanese who had also experienced substantial trauma and fracture appeared to cope less with suffering than their Palestinian counterparts.

Inequality II

EXPLAINING SPATIAL VARIATION IN ACCESS TO CORONARY REVASCULARISATION

A.M. Crook[1,2], L. Knorr-Held[3], S. Richardson[1], H. Hemingway[2,4]. *[1]Department of Epidemiology and Public Health, Imperial College, London, UK; [2]Department of Public Health Research, Westminster PCT, London, UK; [3]Department of Statistics, University of Munich, Germany; [4]Department of Epidemiology and Public Health, University College London, UK*

Background: Previous studies have suggested that patients living in more deprived areas or in areas far from a cardiothoracic unit are less likely to undergo coronary revascularisation. Such studies, however, were mainly ecological and lacked patient specific data to adequately adjust for clinical need. Very few studies have explicitly considered spatial effects in which neighbouring areas are assumed to be more similar than non neighbouring areas.

Aims: To determine the extent of spatial variation in revascularisation after angiography. To determine the influence of patient clinical need, supply of health services, and social factors on any spatial variation.

Patients and Areas: 3015 patients with angiographically documented coronary artery disease in the Appropriateness of Coronary Revascularisation (ACRE) Study. Angiography referrals came from five contiguous former health authorities covering 488 electoral wards in the City and East London and Essex.

Methods: A Bayesian hierarchical spatial time to event model was adopted. Time to event was the waiting time from angiography (diagnosis) to initial revascularisation procedure (coronary angioplasty (PTCA) or coronary artery bypass graft (CABG)). Electoral ward was fitted as a spatial effect. Patients' clinical need was defined by age, sex, number of diseased vessels, symptom severity, history of previous revascularisation, and operative risk; supply factors by the local referring hospital; and social factors by Carstairs deprivation index.

Results: Wide spatial variation in access to revascularisation was observed. Adjusting for patient need, hazard ratios (HR) for wards with the highest and lowest "risk" of CABG, ranged from 0.83 to 1.18 (compared with the average risk across all wards). For PTCA, the HRs ranged from 0.73 to 1.37. Adjusting for referring hospital reduced the HR range for CABG to 0.91 to 1.13 and for PTCA to 0.83 to 1.19. Deprivation did not reduce the overall size of spatial variation, however, there was some evidence that the patients in very deprived wards (Carstairs score >5) were less likely to undergo CABG. Maps of HR estimates showed that higher "risks" of revascularisation were not confined to areas in close proximity to the cardiothoracic unit.

Conclusion: Place of residence influenced access to revascularisation after angiography. This spatial variability was in part explained by local referring hospital, but social deprivation and distance from tertiary centre had no influence on the amount of spatial variation.

EVIDENCE FOR A SEX, AGE, AND SOCIAL VARIATION IN PRESCRIBING CARDIOVASCULAR THERAPIES TO THE ELDERLY IN PRIMARY CARE

C. Usher, K. Bennett, J. Feely. *Department of Pharmacology and Therapeutics, Trinity Centre, St. James's Hospital, Dublin 8, Ireland*

Objective: To determine (a) the extent to which cardiovascular therapies are prescribed to elderly patients and (b) whether a sex, age, or social variation exists in such prescribing in this population.

Methods: We identified the study population using a national primary care prescribing database. All patients receiving any prescription during a 1 year period (January–December 2001) in the Eastern Region Health Authority (ERHA) in Ireland were identified (n=117 225; 93.6% of the total ERHA population). These patients are covered by the General Medical Services scheme, which provides free health care to those eligible for the scheme. Within the study population a cohort of non-means tested (non-deprived) elderly (n=20 057) were considered and comparison made to the means tested (deprived) elderly from July to December 2001. Odds Ratios (OR) and 95% CI were determined using logistic regression for sex, deprived *v* non-deprived elderly, and individual age groups (65–69, 70–74, and over 75 year olds).

Results: Aspirin was prescribed to the greatest extent in the study population (342.6 per 1000 population). Vasodilators and cholesterol lowering therapy were prescribed to the least extent (112.4 and 130.3 respectively, per 1000 population). After adjustment for age, men were more likely to receive a prescription for a vasodilator (OR=1.58, 1.52–1.64) and aspirin (OR=1.40, 1.37–1.45). Women, however, were more likely to receive a prescription for a diuretic (OR=1.37, 1.33–1.41). The over 75 year olds were more likely to receive a prescription for a vasodilator (OR=1.24, 1.18–1.31), a diuretic (OR=2.04, 1.96–2.11), and aspirin (OR=1.50, 1.47–1.58) than those aged 65–69 years. They were less likely to receive a prescription for cholesterol lowering therapy (OR=0.49, 0.47–0.52). The non-deprived elderly were more likely to receive a prescription for cholesterol lowering therapy (OR=1.26, 1.20–1.32) than the deprived elderly.

Summary: These data suggest that sex, age, and level of deprivation influence cardiovascular prescribing in the ERHA of Ireland. In particular, men are more likely to be prescribed these therapies than women, the very elderly are more likely to receive most of these therapies, except cholesterol lowering therapy, and the more deprived are less likely to receive cardiovascular preventative therapies. These findings reflect the relatively low amount of evidence found in the literature on cardiovascular prescribing in this age group, but also a possible

trend towards prescribing of less preventative therapies, such as cholesterol lowering therapy, to the more deprived elderly population.

URBAN/RURAL INEQUALITIES IN ISCHAEMIC HEART DISEASE AND THEIR ASSOCIATION WITH DEPRIVATION

K.A. Levin. *MRC Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK*

Background: Ischaemic heart disease (IHD) mortality has been declining in the UK since the 1970s. Nevertheless, it accounted for 22% of deaths in Scotland in 2000. Until recently rural areas were regarded as healthy. However, results from studies using health indicators are easy to misinterpret. An area with low GP consultation rates due to lack of resources or poor access to services, for example, may be misinterpreted as a healthy area. One solution might be to incorporate a range of health measures when assessing urban–rural inequalities.

Objectives: To describe the pattern and magnitude of urban/rural variation in IHD in Scotland using three health indicators and to examine the relationship between health, rurality, and deprivation.

Data and Methods: Scotland was split into eight geographies and three IHD health indicators. Mortality, hospital admissions, and mortality within 28 days of admission to hospital (MWAH) were investigated using 1986–95 data for all of Scotland. Multilevel Poisson models, adjusting for age and sex, were created. The Carstairs Index was included in the models to investigate the relationship between rurality and deprivation for each of the health indicators.

Results: Adjusting for age, sex, and deprivation, the area described as very remote rural has lower IHD mortality than that of urban Scotland (RR=0.96), however, this difference is not significant at the 95% level. Adjusting for age, sex, and deprivation, hospital admissions are significantly lower in rural areas relative to urban areas (RR=0.71, 0.63, 0.80). MWAH shows significantly higher relative risk in the most rural area than in urban areas (RR=1.10, 1.01, 1.20). The Carstairs Index is significant in all three models, with deprivation being associated with unfavourable outcomes. There is also a significant interaction between Carstairs and rurality in all three models. Deprived urban areas experience significantly greater IHD mortality and hospital admissions than their affluent counterparts. In rural areas deprivation has a weaker effect on these health indicators.

Conclusions: Approximately equal mortality from IHD in urban and rural areas masks the fact that hospital admissions are lower and MWAH is higher in rural areas. This suggests that there may be differences in diagnosis and/or the provision of care between urban and rural areas. Association with deprivation is weaker in rural than in urban areas. The Carstairs Index may be measuring different phenomena in urban and rural areas; alternatively sociocultural differences and health services produce more equitable outcomes in rural areas.

PRIVATE AND NHS REFERRALS FROM GENERAL PRACTICE; THEIR RELATIONSHIP WITH EACH OTHER AND WITH DEPRIVATION

A. Wilson[1], C. Mulvaney[1], C. Coupland[2], V. Hammersley[2], J. Dyas[2], R. Carlisle[3]. [1]*Department of General Practice & Primary Health Care, University of Leicester, UK;* [2]*Division of Primary Care, University of Nottingham, UK;* [3]*Doncaster Central PCT, UK*

Background: Much of the variation in GP referral rates remains unexplained. There is conflicting evidence about the effects of deprivation on NHS referral rates, and no information about the relationship between NHS and private referrals.

Aim: To examine the relationship between private and NHS outpatient referral rates and their association with deprivation.

Design: Prospective cohort study.

Setting: Ten general practices from the Trent Focus Collaborative Research Network.

Method: Participating practices collected anonymised data on all referrals to NHS and private consultants in 2001. Referral rates at electoral ward level were calculated from mid-year registration data, and negative binomial regression models used to derive incidence rate ratios (IRR) and 95% CIs. Wards with fewer than 10 registered patients were excluded as their rates showed substantial variation compared with wards with greater numbers of patients. Likelihood ratio tests were used to test statistical significance. Deprivation was estimated with postcode to ward conversion software, using the Index of Multiple Deprivation Score.

Results: Of 17 138 total referrals, 15 495 (90.4%) were to the NHS and 1642 (9.6%) to the private sector. At practice level age standardised private referral rates (per 1000) varied from 1.7 to 32.6, and NHS rates from 109 to 186. Referral rates were available for 155 wards. Age standardised NHS referral rates were independently associated with private referral rates (IRR of 1.52, 95% CI 1.15 to 1.71 in top quintile for private referral, compared with the lowest), deprivation (IRR for most deprived quintile 1.35, 95% CI 1.13 to 1.62 compared with the least deprived), and practice (IRR of highest referring practice 1.79, 95% CI 1.44 to 2.23, compared with the lowest). The association between private and NHS referral rates was slightly less (IRR 1.34, 95%CI 1.09 to 1.65) when no adjustment was made for deprivation.

Conclusions: Our findings do not support the suggestion that higher levels of referral to the private sector are associated with lower rates of referral to the NHS. Both rates were positively associated with each other, more so after adjustment for deprivation, probably because patients in deprived areas are less able to access the private sector.

INEQUALITY AND INEQUITY: A CASE STUDY, WITH REFLECTION ON POTENTIAL INTERVENTIONS

P. Warner[1], H.O.D. Critchley[2], M.A. Lumsden[3], M. Campbell-Brown[3], A. Douglas[1], G.D. Murray[1]. [1]*Public Health Sciences, University of Edinburgh, UK;* [2]*Obstetrics and Gynaecology, University of Edinburgh, UK;* [3]*Obstetrics and Gynaecology, University of Glasgow, UK*

Objectives: How to quantify population inequalities in health is much debated, as is the distinction between inequality and inequity. Uncertainty surrounds choice of remedial policies and the population outcomes that would denote success. The complexity of this challenge for public health may have distracted from opportunities for simple, low cost interventions that could immediately address proximal increments to inequity in health. Menstrual problem, limited to females, is a useful case study for consideration of the issues.

Menstruation has an adverse impact on health, albeit minor for many women, which can recur monthly from early teenage years to the mid-fifties. Among women of late reproductive age, excessive menstrual bleeding is one of the most common reasons for referral to hospital clinic, and clinical management often involves powerful medication or major surgery. In addition to direct health impact, heavy periods can have an adverse effect on daily life and on limited household budgets. We explore the relationship between heavy menstrual bleeding, socioeconomic circumstances, and outcome of hospital referral, and reflect on potential interventions.

Design and participants: Questionnaire survey of 725 women referred to hospital with heavy periods.

Setting: Three hospital gynaecology clinics in Glasgow and Edinburgh, Scotland.

Outcome Measures: Self reported "severe problems" with volume of blood loss and other aspects of menstrual periods; clinic outcome.

Results: Women referred for heavy periods reported "severe problems" with a range of aspects of periods, most commonly period pain (32%) and mood changes around periods (31%), as well as volume of loss (26%), extra washing resulting from bleeding (18%), and cost of sanitary protection (13%). There was strong evidence of association between Carstairs deprivation and both problematic volume of loss and cost (both χ^2_{trend}>10.2, p <0.001), but most strongly with extra washing and pain before periods (χ^2_{trend}=16.6 and 15.6 respectively, both p <0.0002). Deprived women were more likely to be prescribed hormonal treatments, to fail to return for next appointment (χ^2_{trend}=12.8, p <0.001), and less likely to proceed to hysterectomy within eight month follow up (χ^2_{trend}=3.9, p=0.049).

Conclusions: Heavy periods are more burdensome among those with meagre financial resources. The resulting extra washing can be difficult if there are inadequate laundry facilities, and sanitary protection and pain killers are expensive and compete for scarce family resources. It is possible women affected by both deprivation and heavy bleeding may be consulting health services for what is largely a socioeconomic not biomedical health problem. Alternative simple, low cost interventions will be discussed.