concerns, providing that the removal of tobacco is well managed and enhanced support measures are available for smokers. Some of the general factors shaping the successful introduction of smokefree prisons in Scotland are relevant to other areas of public health transformation e.g. setting clear objectives and timescales; collaboration and teamwork; and involving staff at all levels and end-users in change processes.

Thursday 10 September

Cohort Studies

OP67 HYPERTENSIVE DISORDERS OF PREGNANCY AND THE RISK OF CHRONIC KIDNEY DISEASE: A NATIONAL REGISTRY-BASED COHORT STUDY

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Background Hypertensive disorders of pregnancy (HDP) (preeclampsia, gestational hypertension) are increasingly common complications of pregnancy. HDP are associated with increased risk of cardiovascular disease and end-stage kidney disease in women. Chronic kidney disease (CKD) is highly prevalent, but evidence for associations between HDP and CKD is limited and inconsistent. The underlying causes of CKD are wide-ranging, and HDP may have differential associations with various aetiologies of CKD. We aimed to identify whether HDP are associated with CKD and whether this risk differs by CKD aetiology.

Methods Using data from the Swedish Medical Birth Register, singleton live births from 1973–2012 were identified and linked to data from the Swedish Renal Register and National Patient Register (up to 2013). Preeclampsia was the main exposure of interest and treated as a time-dependent variable. Gestational hypertension was also investigated as a secondary exposure. The primary outcome was maternal CKD, and this was classified into 5 subtypes: hypertensive, diabetic, glomerular/proteinuric, tubulo-interstitial, other/non-specific CKD. Cox proportional hazard regression models were used, adjusting for year of delivery, maternal age, country of origin, education level, antenatal BMI, smoking during pregnancy, gestational diabetes, and parity. Women with pre-pregnancy comorbidities were excluded.

Results The final sample consisted of 1,924,409 women who had 3,726,554 singleton live-births. The mean age of women at first delivery was 27.0 (±5.1) years. Median follow-up was 20.7 (interquartile range 9.9–30.0) years. 90,917 women (4.7%) were diagnosed with preeclampsia, 43,964 (2.3%) had gestational hypertension, and 18,477 (0.9%) developed CKD. Women who had preeclampsia had a higher risk of developing CKD during follow-up (adjusted hazard ratio (aHR) 1.92, 95% CI 1.83–2.03). The risk differed by CKD subtype, and was higher for hypertensive CKD (aHR 3.72, 95% CI 3.05–4.53), diabetic CKD (aHR 3.94, 95% CI 3.38–4.60) and glomerular/proteinuric CKD (aHR 2.06, 95% CI 1.88–2.26). The risk of CKD was increased after preterm preeclampsia, recurrent preeclampsia, or preeclampsia complicated by pre-pregnancy obesity. Women who had gestational hypertension also had increased risk of developing CKD (aHR 1.49, 95% CI 1.38–1.61).

Conclusion Women with history of HDP are at increased risk of CKD, particularly hypertensive or diabetic CKD. Preterm preeclampsia, recurrent preeclampsia, and preeclampsia complicated by pre-pregnancy obesity are all associated with higher risk of maternal CKD. Since 10% of women develop clinically significant CKD in their lifetime, the absolute risk of CKD related to HDP may be substantial. Women who experience HDP may benefit from future systematic renal monitoring to prevent CKD onset or progression.

OP68 TECHNICAL AND PRACTICAL CHALLENGES IN IMPLEMENTING DIGITAL APPLICATIONS FOR SELF-MONITORING VISUAL FUNCTION IN THE MONARCH STUDY

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Background The development and implementation of self-monitoring technologies for chronic conditions would ease the burden on patients and hospital services. Digital applications (apps) on smartphones or tablets can transfer information from a remote setting to a care provider, though technical and practical challenges can arise. The MONARCH study is a multi-centre cohort study evaluating the diagnostic test accuracy of two apps for self-testing visual function at home to detect reactivation of neovascular age-related macular degeneration.

Methods Participants are provided with an iPod to test their visual function weekly using both apps. Data are transmitted automatically using a mobile router to online databases maintained by the app developers. Details of anticipated and unanticipated challenges faced throughout set-up, recruitment and follow-up, and remedial actions, have been carefully documented.

Results As of 17/02/2020, 233/274 (85%) participants (40% male; average age 75) from 6 hospitals self-tested their vision at least once.

Anticipated challenges included potential inequalities in recruitment due to the technologies involved and the need for participant technical support. The primary reason given for non-participation was *'put off by technology'* (21%). A participant helpline received 186 calls (19.7 hours). Issues with one or both apps was the primary reason for calls (47%), followed by connectivity issues (15%).

Unanticipated challenges included issues setting up and managing iPods remotely, technical issues with the apps, and adherence to self-testing during follow-up. Apple's multiple device management system was used, which resulted in limited control over devices and failed to prevent standard system updates. System updates interfered with app compatibility and confused some participants. Issues with the app databases temporarily halted recruitment and data monitoring on several occasions and prevented some participants from testing.

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Participant difficulties in operating the mobile router and issues with app design/interface impeded testing. Phone calls to participants (191, 12.7 hours) were periodically made if data had not been received <14 days since consent or <21 days since previous test. Issues with one or both apps was the primary reason (37%) for lack of data, followed by connectivity issues (26%).

Discussion There are substantial technical and practical issues in providing hardware and implementing digital apps for self-testing visual function with technologically inexperienced patients. Significant support infrastructure is required for patients and device management. Limited control over apps and the requirement for an internet connection added complexities to the testing process in this population. These challenges need to be addressed before implementing digital technologies for self-monitoring that require active patient engagement.

OP69 ASSOCIATION OF ATTRITION WITH MORTALITY: FINDINGS FROM 11 WAVES OVER THREE DECADES OF THE WHITEHALL II STUDY

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Background Attrition, which is loss of participants as a study progresses, is a considerable methodological challenge in longitudinal studies. This current study examined whether two forms of attrition; *'withdrawal'* and *'non-response'* have different associations with mortality, and whether the associations differed across time in multi-wave cohort studies.

Methods Participants were 10 012 civil servants who participated at the baseline of Whitehall II cohort study, which has 11 waves every three years with average follow-up of 28 years. We performed competing-risks analyses to estimate Sub-distribution hazard ratios and 95% Confidence Intervals of the associations between response status (response, withdrawal, non-response) and cardiovascular and non-cardiovascular mortality. Likelihood ratio test was used to investigate whether the hazards of two types of attrition differed from each other. We then examined whether the hazards of mortality differed across waves by applying linear regression. The mortality was tracked by the National Health Services central registry from baseline to August 2017.

Results On average, 58% of attrition at each wave was due to non-response rather than withdrawal. There were 495 deaths recorded from cardiovascular disease and 1367 deaths from other causes. Study participants lost due to attrition had 1.55 (95% confidence interval 1.26 to 1.89) times higher hazard of cardiovascular mortality, and 1.56 (1.39 to 1.76) times higher hazard of non-cardiovascular mortality compared to responders after adjustment for sex, age, ethnicity, marital status, employment grade, smoking habit, alcohol drinking, and physical activity. There was no significant difference across the two forms of attrition; withdrawal and non-response in either hazards of cardiovascular mortality (p-value = 0.284), or hazards of non-cardiovascular mortality (p-value = 0.377). There was no linear trend in hazards over the 11 waves (cardiovascular mortality p=0.111, non-cardiovascular p=0.611).

Conclusion To minimise the possible selection bias, researchers should examine whether exposures and outcomes independently cause a non-participation, and if so, it is recommendable to use statistical approach such as multiple imputation or inverse probability weighting for attrition in longitudinal studies.

OP70 COHORT STUDY OF ADVERSE PREGNANCY OUTCOMES IN WOMEN WITH CHRONIC KIDNEY DISEASE

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Background Chronic kidney disease (CKD) estimated to affect 3% of all pregnancies, and this is expected to rise due to increasing prevalence of maternal age and obesity. Previous studies have shown varying results regarding pregnancy outcomes across different renal conditions. This study aimed to assess the association between pre-pregnancy CKD and the risk of adverse pregnancy outcomes. We further evaluate the associations among women with congenital renal disease, renal failure or kidney transplantation.

Methods This population-based cohort included women who had singleton births in Sweden between 1982 and 2012. Using data from the Medical Birth Register, a total of 2,778,596 babies were born to 1,418,274 mothers. We identified 10,885 babies who were born to women with pre-pregnancy CKD (classified according to ICD-8, ICD-9 and ICD-10). Outcome measures included pre-eclampsia (PE), emergency and elective caesarean sections (CS), spontaneous preterm birth (PTB<37 weeks' gestation), medically indicated PTB, stillbirth and small for gestational age (SGA). Multivariate logistic regression models were conducted using Stata 16 and adjusting for several socio-demographic and perinatal confounders.

Results Compared to women without CKD (reference group), the odds of the following outcomes were higher among women with pre-pregnancy CKD: PE adjusted odds ratio [aOR (95% confidence intervals)]: [1.75 (1.59, 1.92)]; emergency CS [1.37 (1.27, 1.47)]; elective CS [1.67 (1.55, 1.80)]; spontaneous PTB [1.29 (1.16, 1.44)]; medically indicated PTB [1.92 (1.74, 2.11)] and SGA [1.32 (1.19, 1.47)]. Moreover, the odds were higher for women with renal failure and kidney transplantation, compared to women without CKD. Additionally, women with congenital renal disease had higher odds of PE [aOR: 7.99 (4.97, 12.8)] and medically indicated PTB [6.71 (3.82, 11.8)].

Conclusion Despite advances in antenatal care, the risk of adverse pregnancy outcomes among women with CKD are higher compared to women with no CKD. Planning for pregnancy should be optimized before conception in women with kidney failure or who have had a kidney transplantation.

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