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O–1 The MTHFR C677T polymorphism is associated with an increased risk of hypertension: Results of the Generation Scotland: Scottish Family Health Study

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Introduction: The common C677T polymorphism in the gene encoding methylenetetrahydrofolate reductase (MTHFR) is associated with hypertension [1], however, few studies have investigated the contribution of this genetic variant to blood pressure (BP) within a population-based cohort.

Methods: The aim was to investigate the relationship of *MTHFR* genotype with BP and hypertension within a representative sample of the Scottish population aged 18 to 99. Data were accessed from Generation Scotland: Scottish Family Health Study ($n = 19{,}994$) [2]. The association of *MTHFR* genotype with BP was examined by age and sex groups using one-way ANCOVA, whilst logistic regression was performed to investigate the risk of hypertension in relation to *MTHFR* genotype.

Results: The variant *MTHFR* 677TT genotype was identified in 11.4% of Scottish adults. Significantly higher systolic (+9.2 mmHg) and diastolic (+9.6 mmHg) BP was observed in the TT compared to CC genotype group ($p < 0.001$); correspondingly, a greater proportion of TT (30.6%) compared to non-TT (CC = 6.4%, CT = 7.9%; $p < 0.001$) adults were hypertensive according to NICE guidelines. Furthermore, the TT genotype was associated with a much-increased risk of hypertension (OR 7.52, 95% CI, 6.00–9.40; $p < 0.001$) following adjustment for relevant covariates, age, sex, BMI, cholesterol, creatinine, alcohol intake and smoking status. In TT adults <30 years, mean systolic BP (121.8 mmHg) was +6.6 mmHg higher than CC adults of a similar age, and was similar of that in non-TT adults aged >50 years. In addition, family members of TT compared with CC adults were more likely to have higher BP.

Conclusions: The results demonstrate, for the first time in a population-based cohort, that the variant *MTHFR* 677TT genotype is associated with higher systolic and diastolic BP in all age-groups and a 7-fold higher risk of hypertension. Further studies are required to investigate the underpinning mechanisms and the long-term health outcomes associated with this genetic risk factor.

Disclosures: None

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O–2 Integrating clinical, genomic, metabolomic and dietary data through machine learning to improve our understanding of their influences on blood pressure regulation

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Introduction: Hypertension is a major contributor to the global burden of disease(1). Novel drug development and population control for hypertension has plateaued(2). Advances in high-throughput technologies along with newer analytic methods, including machine learning, facilitates integrated analyses of hypertension to be conducted that captures its underlying complexity. Here, we aimed to understand the multifactorial contributors of BP regulation by integrating multimodal data.

Methods: We integrated metabolomics, genomics, clinical phenotypes, and dietary data from the deeply phenotyped cross-sectional TwinsUK cohort using the XGBoost machine learning algorithm(3). We used 5-fold cross-validation (80% training, 20% test) to test the performance of the model and identify features of importance in context of one another in 4,863 participants, aged 17–75 years and not using antihypertensive medication, with concurrent measures. Included in the algorithm was 206 circulating metabolites, polygenic risk score for BP, energy intake and intake for 45 nutrients, and clinical parameters. Our model was then applied in an independent sample of individuals from the Qatari Biobank (QBB).

Results: Our machine learning multi-omic approach explained 39·2 ± 4·5% of the variance in SBP. Of the top 50 features, the most influential non-demographic variables were dihomo-linolenate, cis-4-decenoyl carnitine, lactate, chloride, urate, and creatinine along with dietary intakes of total, trans and saturated fat. We also highlight the incremental value of each included dimension. The addition of metabolites to clinical and anthropometric features increased the R2 by 10%, but the further addition of dietary features only improved R2 by 0.1%. The model performed well (45·2% ± 13·39%) when tested in the QBB cohort and results were consistent.

Conclusions: We show that integrated analyses of omics, clinical and dietary data improves our understanding of their in-between relationships and expand the range of potential biomarkers for a sequential set of follow-on studies to model and mechanistically explore.

Disclosures: One co-author is a co-founder of Zoe Global. All other authors declare no competing financial interests.

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O–3 Early ventricular systolic function is reduced in children with chronic kidney disease and associated with worsening left ventricular mass and diastolic dysfunction

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Introduction: Children with chronic kidney disease (CKD) exhibit blood pressure independent LV dysfunction[1] and suffer from increased risk of cardiovascular death. First-phase ejection fraction (EF1), a novel measure of early systolic function is associated with prolonged myocardial wall stress and diastolic dysfunction in children with hypertension. [2] Whether EF1 is reduced in children with CKD is unknown.

Methods: Echocardiography was performed in 375 children (231 boys) aged 10.9 ± 3.7 (mean±SD) years, including 63 healthy controls and those with CKD were stratified according to estimated glomerular filtration rate (eGFR) (mL/min per 1.73cm2) >90 (CKD 1, n = 83), 60–90 (CKD 2, n = 55), 30–59 (CKD 3, n = 91) and <30 (CKD ≥ 4, n = 83). EF1 was calculated from the fraction of LV volume ejected up to the time of peak aortic flow velocity. e' and E/e' were used as measures of diastolic function.

Results: Children in CKD ≥ 4 group were older and had lower BMI z-score, higher systolic and diastolic blood pressure, left ventricular mass index (LVMi) and relative wall thickness (all $p < 0.001$). E/e' was increased and septal e' was decreased in children with CKD compared to controls ($p < 0.001$). EF1 was significantly lower in children with CKD and decreased across stages of CKD (EF1: 29.3 ± 3.7%, 23.5 ± 4.5%, 19.8 ± 4.0%, 18.5 ± 5.1% and 16.7 ± 6.6% in controls, CKD 1, 2, 3 and ≥4, respectively, $p < 0.001$), whilst overall EF was similar between groups. This relationship persisted after adjustment for age, gender, height z-score, SBP z-score, anti-hypertensive medications, LVMi, EF, E/e' and S wave ($p < 0.001$). In a linear regression analysis, EF1 was independently associated with eGFR after adjustment for the same confounders ($\beta = 0.503$, $p < 0.001$). EF1 was also negatively associated with E/e' ($\beta = -0.175$, $p = 0.005$) and LVMi ($\beta = -0.198$, $p = 0.002$).

Conclusions: EF1 as a novel measure of early systolic function, is reduced in children with CKD compared to children with normal function and worsens with lower eGFR. Impairment of EF1 is associated with worsening LVMi and diastolic dysfunction.

Disclosures: HG and PC are named on a patent of EF1 (WIPO (PCT) number: WO2017144851A1) (https://patents.google.com/patent/WO2017144851A1/en).

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O–4 Investigating the potential role of R-Ras in blood pressure control

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Introduction: Elevated blood pressure (BP) is a major risk factor for cardiovascular mortality. Genome-wide association studies (GWAS) have been employed to identify genes contributing to the polygenic nature of BP. A meta-analysis of Exome chip genotypes from over 300,000 individuals identified a rare missense single nucleotide variant, rs61760904, associated with a relatively large effect on systolic BP (SBP) [1]. This variant is located in an exon in the small GTPase R-Ras. R-Ras is implicated in cardiovascular processes, this study is the first to investigate the potential role of R-Ras in BP control.

Methods: The BP phenotype of the Rras-DEL415 knockout (KO) mouse model was characterised using in vivo radiotelemetry BP and ex vivo organ bath pharmacology. Phosphoproteomics was performed on murine aortae to characterise the phospho-signalling profile of R-Ras.

Results: BP radiotelemetry in young KO mice aged 8 weeks did not detect a BP phenotype, however aged mice (10 – 12 months) exhibited elevated diurnal SBP (Day, wild-type (WT) = 117.8 mmHg ± 6.50, KO = 127.5 mmHg ± 6.62, $p = 0.027$, Night, WT = 129.6 mmHg ± 8.80, KO = 139.3 mmHg ± 6.83, $p = 0.028$, WT $n = 5$, KO $n = 6$). In organ bath experiments, aortae from young R-Ras KO mice exhibited normal vasodilatory and contractile responses. Phosphoproteomic analysis of WT and R-Ras KO aortae from young mice revealed 702 differentially phosphorylated sites (p value < 0.05, log2 fold change >2, <−2). Loci including 62 of these genes have GWAS associations with BP traits or hypertension (e.g. *Tns2*, *Bag6*, *Pde3a*).

Conclusions: Together, these data indicate R-Ras has a potential role in mechanisms of BP control, notably however the impact of R-Ras KO may be masked by compensatory mechanisms in young mice, becoming apparent in an age-related hypertensive model.

Disclosures: None

Reference:

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O–5 Elucidating the genetic architecture of extreme early onset hypertension using whole genome sequencing data

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Introduction: Extreme early-onset hypertension (EEHTN) describes blood pressure >160/100 mmHg in clinic in under 30s. These patients have a fraught journey towards diagnosis and initiation of management. Using Whole Genome Sequencing (WGS) combined with phenotypic information provided by the 100,000 Genomes Project (100KGP), we characterized the genetic architecture of EEHTN to understand its pathogenesis while assessing the contribution of WGS to diagnosis.

Methods: We derived two cohorts, those recruited to the 100KGP with EEHTN with known secondary causes of hypertension excluded (179 cases) and those with hypertension diagnosed before 30, derived using Hospital Episode Statistics (901 cases). We performed a sequencing-based genome-wide association study among unrelated cohort members compared with ~20,000 unrelated, ancestry-matched unaffected controls from the 100KGP. The analysis was inclusive of individuals with diverse genetic ancestry. Enrichment of common, low-frequency (minor allele frequency [MAF] > 0.1%) and rare (MAF < 0.1%) single-nucleotide variant (SNV), insertion/deletion variant (indel) and rare structural variant (SV) alleles on a genome-wide and per-gene basis was sought using a generalised linear mixed model approach, accounting for population structure.

Results: Analysis of rare exonic, likely damaging, SNVs and indels revealed PKD1 ($P = 2.70 \times 10^{-13}$) as significantly associated with EEHTN. 78.6% (22/28) of individuals harbouring qualifying PKD1 variants had clinical evidence of polycystic kidney disease. Genome-wide analysis of ~10,000,000 common and low-frequency variants did not reveal statistically significant associations with disease. Analysis of SVs in known EEHTN-linked genes revealed statistically significant enrichments in inversions in HSD11B2 ($P = 2.2 \times 10^{-16}$) and CUL3 ($P = 0.02179$).

Conclusions: These findings represent a thorough examination of the genetic architecture of a national EEHTN cohort using well-controlled statistical methodology. The low yield of WGS in diagnosis brings into question its utility as a population level clinical tool but provides insights into EEHTN biology.

Disclosures: The authors have no competing interests.

References: None

O–6 Primary hypertension, anti-hypertensive medications and the risk of severe COVID-19 in UK Biobank

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Introduction: Hypertension appears to be one of the commonest comorbidities in COVID-19 patients, although whether hypertensive individuals have a higher risk of severe COVID-19 compared with non-hypertensives is unclear. It is also unclear whether the absolute level of systolic blood pressure, or the type of anti-hypertensive medication is related to this risk.

Methods: Analyses were conducted using data from the UK Biobank and linked health records. Logistic regression models were fitted to assess the impact of hypertension, systolic blood pressure and medications on the risk of severe COVID-19.

Results: 17,094 individuals tested positive for severe acute respiratory syndrome-coronavirus, 22% (n = 3,774) developed severe COVID-19 and 40% (n = 6,899) were hypertensive. Hypertension was associated with 25% higher odds of severe COVID-19 (OR 1.25; 95% CI 1.15, 1.36), compared with normotension after adjusting for confounding variables. In those taking anti-hypertensive medications, elevated systolic blood pressure showed a dose-response relationship with severe COVID-19 (150–159 mmHg versus 120–129 mmHg (OR 1.51; 95% CI 1.15, 1.97), >180+mmHg versus 120–129 mmHg (OR 2.10; 95% CI 1.21, 3.67)). Systolic blood pressure <120 mmHg was associated with greater odds of severe COVID-19 (OR 1.37; 95% CI 1.08, 1.74). Angiotensin-converting enzyme inhibitors or angiotensin-II receptor blockers were not associated with altered risk of severe COVID-19.

Conclusions: Hypertension is an important risk factor for COVID-19. A better understanding of the underlying mechanisms is warranted in case of more severe strains or other viruses in the future.

Disclosures: None

References: None

O–7 Blood pressure self-monitoring in pregnant women from ethnic minorities and deprived areas: A secondary analysis of the BUMP 1 trial

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Introduction: Self-monitoring of blood pressure (SMBP) during pregnancy has the potential to improve the detection of

hypertension and the subsequent management of gestational hypertensive disorders. This secondary analysis aimed to evaluate the adherence to SMBP, and differences between SMBP and clinic BP readings of pregnant women from different ethnic minority and deprived groups.

Methods: This was a secondary analysis of data from the BUMP1 trial (NCT03334149) which included women at higher risk of pre-eclampsia. Adherence to SMBP was calculated as the percentage of expected SMBP readings submitted compared to the number they were asked to complete. Mean differences between the clinic and SMBP readings across gestation was also calculated.

Results: Of the 1220 women randomised to SMBP 1073 women (87.95 %) provided SMBP data. Adherence was significantly lower in women from Black/British and Asian/Asian British groups compared to women from the White groups. The mean percentage of expected SMBP readings submitted was 60.1% (95% CI 53.5–66.0), 53.1% (95% CI 45.6–60.7) and 68.5% (95% CI 66.3–70.8) in Asian/Asian British, Black/Black British and White women respectively. Adherence was also significantly lower in the most deprived groups (percentage of SMBP readings submitted = 59.8% (95% CI 53.7–66.0)) compared to women from the least deprived groups (percentage of SMBP readings submitted = 69.9% (95% CI 66.1–73.6)). Overall clinic systolic BP readings were 6.1 mmHg (95% CI 5.9–6.2) higher than SMBP readings and the level of WCE varied across gestation.

Conclusions: Adherence to SMBP during pregnancy was significantly lower in Black/Black British, Asian/Asian British women than in White women across gestation. There was a clear variation in the differences between SMBP and clinic readings across gestation and overall, the clinic readings were consistently higher highlighting the need to consider lower diagnostic thresholds of hypertension for SMBP during pregnancy.

Disclosures: None

References: None

O–8 Classifying hypertension mediated left ventricular hypertrophy patterns from the electrocardiogram using machine learning

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Introduction: Hypertension has progressive end-organ effects such as left ventricular hypertrophy (LVH), an established independent predictor of cardiovascular morbidity and mortality [1]. Four distinct LVH phenotypes with varying prognostic implications have been described using cardiac magnetic resonance (CMR) LV mass to volume ratio: normal LV, LV remodelling, eccentric LVH and concentric LVH [2]. Current electrocardiogram (ECG) criteria can detect LVH but their ability to differentiate between LVH patterns is unknown.

Methods: A total of 38,505 participants from the UK Biobank were categorised into the CMR-defined LVH patterns [3]. ECG biomarkers with a known physiological association with LVH were extracted from the 12-lead ECG of each participant. Chi-Squared test was used for ECG biomarker selection and classification was performed using support vector machine (SVM). The dataset was split into 80% training set and 20% testing set for performance measurement. Ten-fold cross validation was applied to train the SVM algorithm and the training set was downsampled to the minority group.

Results: The combination of the top 40 ranking ECG biomarkers were used in the SVM classifier. Overall, classification of LVH patterns had 40% accuracy (sensitivity 43%, specificity 82%, AUC 0.75). Classification of normal LV group reached 46% accuracy (sensitivity 46%, specificity 58%, AUC 0.58), LV remodelling 31% accuracy (sensitivity 31%, specificity 85%, AUC 0.68), eccentric LVH 58% accuracy (sensitivity 58%, specificity 91%, AUC 0.87) and concentric LVH 52% accuracy (sensitivity 52%, specificity 91%, AUC 0.77).

Conclusions: A combination of extracted morphological ECG biomarkers in the SVM classifier were able to discriminate between the hypertension mediated LVH patterns with varying levels of accuracy. Our findings provide support for the ECG as an inexpensive screening tool to identify extremes of LVH. In future work we will use deep learning for comparison and explore heterogenous patient populations with more cases of LVH for optimisation.

Disclosures: This study was conducted using the UK Biobank resource under access application 2964. We would like to thank all the participants, staff involved with planning, collection and analysis, including core lab analysis of the CMR imaging data. HN is supported by the British Heart Foundation Pat Merriman Clinical Research Fellowship (FS/20/22/34640). JR acknowledges funding from the European Union-NextGenerationEU. SEP acknowledges the British Heart Foundation for funding the manual analysis to create a cardiovascular magnetic resonance imaging reference standard for the UK Biobank imaging resource in 5000 CMR scans (www.bhf.org.uk;PG/14/89/31194). SEP and PBM acknowledge support from the National Institute for Health Research (NIHR) Biomedical Research Centre at Barts. S.E.P. and KL have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 825903 (euCanSHare project). SEP provides consultancy to and is shareholder of Circle Cardiovascular Imaging Inc., Calgary, Alberta, Canada.

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O–9 Factors affecting hypertension outcomes in patients with primary aldosteronism undergoing unilateral adrenalectomy

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Introduction: Laparoscopic adrenalectomy is the treatment of choice in unilateral (U/L) primary aldosteronism (PA). Surgical treatment is also undertaken in patients with evidence for U/L

secretion in patients with bilateral (B/L) imaging findings. The aim of this retrospective study was to identify factors that affect clinical response to adrenalectomy.

Methods: Demographic and clinical parameters of patients who underwent adrenalectomy for PA were reviewed. 115 patients were included for analysis (mean age at surgery: 49.7 ± 9 (26–73), gender distribution: Males = 73, Females = 42). Clinical outcomes at 3–6 months post- surgery were classified into cure as complete cessation of antihypertensives post-surgery and a BP < 140/90 mmHg, partial response as any reduction in medications, and no response as no change were used for analysis. A binary classification defined as favourable response: cure +≥50% reduction in medications, and unfavourable response: no response +≤50% reduction in medications was further analysed using Kruskal-Wallis, Fisher's exact, and binary logistic regression tests (SPSS V28).

Results: Overall, 75% had a favourable outcome and 39% a cure. Adrenal imaging findings were categorised into U/L disease (n = 69), B/L disease (n = 19), or normal (n = 11). The cure rate was 50% and 15% in the U/Land B/L groups, respectively. Younger age (p = 0.001), females (p = 0.001), shorter duration of hypertension (0.016), higher pre-operative aldosterone renin ratio (p = 0.024), and a higher lateralization index (LI) on adrenal venous sampling (AVS) (p = 0.025) were associated with favourable response. Logistic regression revealed every unit rise in lateralization index led to an increase in favourable response (change in odds by 68% (p = 0.03)).

Conclusions: Despite 75% of patients achieving a favourable response only 40% were cured. Imaging as well as AVS results were found to predict response. This study highlights a need to prospectively study factors affecting outcomes in PA, to improve patient selection for surgery.

Disclosures: None

References: None

O–10 Machine learning based disease progression model for young adults with hypertension

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Introduction: Understanding early patterns of organ damage related to hypertension may help identify young people with more advanced disease who could benefit from interventions. We applied a novel semi-supervised machine learning approach that extracts pseudo-temporal information from cross-sectional data to define progression of end organ changes in young adults.

Methods: Two models were developed. The first was based on 66 echocardiography variables and the second on 609 cardiac, vascular, and cerebrovascular magnetic resonance imaging (MRI) features within a cohort of 411 young adults (29 ± 6 years) with a range of blood pressure measures. A contrastive trajectory inference approach was applied to identify low-dimensional patterns in participants with high systolic blood pressure (160 mmHg) relative to normotensives (<120 mmHg). For each model, participants were assigned a score from zero (health) to one (disease). Multivariate regression analyses were then applied to study associations of the scores with clinical and lifestyle modification measures, as well as to evaluate whether the complex multi-organ MRI-based score could be predicted from simple echocardiography measures.

Results: After contrastive dimensionality reduction, the echocardiography model identified 21 variables and the MRI score 203 features describing patterns of end organ changes related to hypertension in the cohort. The echocardiography-derived score related to a traditional modifiable cardiac risk factor score ($p < 0.0001$) and duration of hypertension treatment ($p < 0.0001$). A reduction in the score was achieved after a 16-week exercise intervention proportional to intervention compliance ($p = 0.04$) and improvement in ventilatory threshold ($p = 0.01$). The MRI-based multi-organ complex score could be predicted with acceptable accuracy from a combined set of echocardiography measures ($p < 0.0001$).

Conclusions: A pseudo-temporal disease progression model can be derived from cross-sectional data to describe cardiac, vascular, and cerebrovascular remodelling patterns related to hypertension in young people. Score derived from the models may help clinicians personalise management of hypertension in younger patients.

Disclosures: The development of a scoring system for description of cardiovascular disease progression are subject to a patent application (no. 2113322.8, September 2021 [PL, AL, AF, WL, and MA]). All other authors declare no competing interest.

References: None

O–11 Short-term low iodine diet alters vascular reactivity independent of thyroid hormone levels in stroke-prone spontaneously hypertensive rats

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Introduction: Iodine is an essential microelement required for thyroid hormone (TH) synthesis. Recent evident links iodine to direct cardiovascular functional changes independent of TH. We aimed to determine the short-term effect of a low iodine diet on cardiovascular parameters in young Wistar Kyoto (WKY) and stroke-prone spontaneously hypertensive (SHRSP) rats.

Methods: 5-week-old WKY and SHRSP males and females (n = 5–7 per group) were assigned a normal (NID) or low iodine (LID) diet for 4 weeks. Tail cuff blood pressure (BP) and body weight were measured weekly while water consumption and urine production were determined fortnightly. At sacrifice, thyroid tissue was snap-frozen for sodium iodide symporter (NIS) gene expression. We collected plasma for thyroid-stimulating hormone (TSH), free triiodothyronine (fT_3), and free thyroxine (fT_4) measurement. Mesenteric arteries were assessed for vascular function using wire myography. Data was analysed by ANOVA and a $p < 0.05$ was considered significant.

Results: Baseline TSH, fT_3, and fT_4 levels were not significantly different between strains. LID did not influence body weight or BP. TSH levels, but not fT_3 or fT_4, increased by 63.3% in SHRSP males and 74.5% females fed LID when compared to sex- and age-matched WKY-fed NID ($p = 0.0002$, $p = 0.018$ respectively). NIS expression increased 3.27 fold in WKY males fed LID but not in SHRSP males when compared to WKY and SHRSP males fed NID, respectively ($p = 0.03$). Water intake/urine output ratio increased by 53.62% in SHRSP females fed LID compared to SHRSP females fed NID ($p = 0.04$). Vascular reactivity in mesenteric arteries increased by 24.9% in SHRSP males fed LID compared to SHRSP males fed NID ($p = 0.03$).

Conclusions: Results demonstrate that short-term LID has the potential to modify cardiovascular parameters in an animal model of cardiovascular disease, independent of changes in fT_3 and fT_4 levels.

Disclosures: None
References: None

O–12 Investigating the Effects of CRISPR/Cas9 Gene Editing on Cardiac Structure and Function in a Rat Model of Cardiovascular Disease

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Introduction: Following identification of a quantitative trait locus (QTL) for left ventricular mass (LVM) on rat chromosome 14, a congenic strain on the normotensive (WKY) and hypertensive (SHRSP) backgrounds were generated (WKY.SPGla14a & SP.WKY-Gla14a respectively). From studies using these animals, the *Spp1* gene was causally and functionally implicated in the development of left ventricular hypertrophy, independent of blood pressure. The CRISPR/Cas9 system was used to introduce a mutation into the *Spp1* gene of SHRSP/A3NCrl embryos to generate a transgenic "knock out" strain to understand molecular actions of *Spp1*, in the context of a genetic model of cardiovascular disease.

Methods: Parental, congenic and transgenic strains were bred and selectively phenotyped at 1–3 day neonatal, 5- and 16-week timepoints. Heart and kidney tissues were removed, and snap frozen in liquid nitrogen. Neonatal hearts were split to extract both protein and RNA from individual hearts. Liver tissue was collected for DNA extraction and genotype confirmation. Protein was analysed by SDS-PAGE gel electrophoresis and immunoblotting. End-point PCR primers were designed over exon boundaries flanking exon 4 containing deletion mutation.

Results: There were no differences in heart, body or heart to body weight ratio of neonatal (KO = 5.33 mg/kg, WT = 6.34 mg/kg $p = 0.669$) or 5-week-old *Spp1*+/+ (WT) and *Spp1*−/− (KO) animals. (KO = 4.44 mg/kg, WT = 4.47 mg/kg, $p = 0.759$). Cardiac assessment by echocardiography revealed no significant difference in LVM ($p = 0.961$). Western blotting analyses revealed *Spp1* protein expression was maintained in *Spp1*−/− animals. End point PCR suggested an Spp1−/− animals produce an alternative RNA form of *Spp1* to rescue protein expression.

Conclusions: *Spp1*−/− animals produced using CRISPR/cas9 technology produce a truncated form of *Spp1* protein, potentially through alternative splicing removing exon contain point mutations. Sanger sequencing of alternative and wild type *Spp1* transcripts has been used to confirm end-point PCR findings.

Disclosures: None
References: None

O–13 Autonomic regulation of large artery stiffness: a pilot study in hypertension

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Introduction: We previously demonstrated that arterial stiffness (AS) can be modulated by pressure-independent mechanisms in hypertension (HT) including the autonomic nervous system. Using a non-invasive lower-limb venous occlusion technique (LVO), we showed an increase in AS (measured as carotid-femoral pulse wave velocity; cf-PWV) that is unrelated with the expected hemodynamic changes, particularly with blood pressure (BP) [1]. Here we examined whether phentolamine, a non-selective alpha-adrenoceptor antagonist, can modulate AS in response to LVO.

Methods: Subjects with essential HT were cannulated in the antecubital fossa and remained supine for 30 minutes before baseline assessments. Placebo (saline; 25 ml) and active drug (phentolamine; 5 mg over 20 minutes) were administered. LVO was performed 10 minutes after each infusion (with cuffs inflated for a total of 10 minutes). BP, hear rate (HR), cf-PWV and heart rate variability (HRV) were measured before and after LVO.

Results: 14 subjects (85% male) with (mean ± SEM) age of 49.5 ± 3.3 years and baseline BP of 155/94 ± 6/3 mmHg were recruited. During placebo, LVO had no significant effect on BP, HR, and HRV but cf-PWV increased by 1.9 ± 0.6 m/s, P = 0.006. Whereas during phentolamine, LVO did not produce any significant changes in BP, HR, HRV and cf-PWV (0.2 ± 0.5 m/s, P = 0.672). Comparing the two, cf-PWV post-LVO during placebo and phentolamine showed a mean difference of 1.7 ± 0.7 m/s (P = 0.026) despite no difference in BP response (−1.7 ± 1.7 mmHg, P = 0.324).

Conclusions: Increase in cf-PWV during non-invasive pre-load reduction induced by LVO is at least in part modulated by the activation of the autonomic nervous system. Further studies are warranted to elucidate the clinical implication of this observation.

Disclosures: None
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O–14 One-year of isometric exercise training for blood pressure management: a prospective randomized controlled study

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Introduction: Isometric exercise training (IET) over 4–12 weeks is an effective anti-hypertensive intervention. However, blood pressure (BP) reductions are reversible if exercise is not maintained. No work to date has investigated the long-term effects of IET on resting blood pressure.

Methods: We randomised 24 unmedicated hypertensive patients to a 1-year wall squat IET intervention or non-intervention control group. Resting BP and various clinically important haemodynamic variables including heart rate (HR), stroke volume (SV), cardiac output (CO) and total peripheral resistance (TPR) were measured pre and post the 1-year study period.

Results: 1-year of IET produced statistically significant reductions in resting systolic BP (−10.5 ± 5 mmHg, p < 0.001), mean BP (−9.9 ± 4.9 mmHg, p < 0.001) and diastolic BP (−8.0 ± 5.8 mmHg, p < 0.001) compared to the control group. There was also a significant reduction in resting HR (−3.9 ± 3.7 b·min^{-1}, p = 0.009) and significant increase in SV (11.8 ± 12.8 ml, p = 0.005), with no significant change in CO (0.2 ± 0.8 L·min^{-1}, p = 0.569). TPR decreased following IET (−295 ± 250 dyne·s·cm^{-5}, p = 0.106). Adherence to the IET sessions was 77% across all participants (3x IET sessions per week), with no participant withdrawals.

Conclusions: This novel study supports IET as an effective long-term strategy for the management of resting BP, producing clinically important, chronic BP adaptations in hypertensive patients. Importantly, this work also demonstrates impressive long-term

adherence rates, further supporting the implementation of IET as a means of effective BP management in clinical populations.

Disclosures: None

References: None

O–16 Adherence to antihypertensive drugs: measuring self-reported and objective levels of adherence and reasons for non-adherence in UK patients with hypertension

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Introduction: Poor medication adherence in hypertensive patients is common [1], reducing clinical benefit and wasting resources. Understanding non-adherence is essential for designing interventions to improve adherence. Behavioural science frameworks can help assess adherence predictors. This study compared self-reported with objectively-measured adherence, and investigated psychological barriers and facilitators of medication adherence.

Methods: Participants were recruited from two London general practices. Participants completed a survey and provided a urine sample to test for metabolites of antihypertensives (indicating adherence in past 24 hours). The survey included a 3-item self-report measure of adherence to antihypertensive medication in the past week [2]. The survey also assessed demographics, and psychological determinants of medication adherence. The psychological questions assessed 18 different domains, based on the Theoretical Domains Framework, a comprehensive framework of behavioural predictors [3]. Participants were classified "fully-adherent" or "not-fully-adherent", separately for the self-report and urine tests. Backwards stepwise logistic regression assessed psychological predictors of self-reported adherence.

Results: 152 participants completed the survey (Mage = 67.5), of whom 150 had urine data. 43 participants (28.3%) were not-fully-adherent from the self-report measure, but only 16 (10.7%) from the urine test. Participants taking three or more medications were more likely to be fully-adherent ($b = 1.114$, $p = .034$). Experience of side-effects ($b = -0.475$, $p = .049$), and agreeing with contextual barriers (e.g. running out of medication, finding it hard to take when not at home) ($b = -0.816$, $p = .002$) were both associated with being not-fully-adherent. Having a medication goal was a significant predictor of being fully-adherent ($b = 0.76$, $p = .034$).

Conclusions: Greater non-adherence was observed in self-reported compared with urine tested adherence - possibly due to the different measurement timeframes–indicating the difficulty in ascertaining a gold-standard for adherence measurement. Having goals to be adherent, experiencing negative side effects, and contextual barriers were independent predictors of self-reported adherence, and should be considered when designing adherence interventions for anti-hypertensives.

Disclosures: None

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O–17 Genome-wide analysis in over 1 million individuals reveals over 2,000 independent genetic signals for blood pressure

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Introduction: Two separate Genome-Wide Association Studies (GWAS) recently reported >1,000 genes associated with blood pressure (BP)[1,2]. Literature suggests that increasing sample sizes can boost discovery further. We therefore combined all data from these two previous studies into one single analysis, to perform the largest BP-GWAS to date.

Methods: We meta-analysed all available GWAS data from UK Biobank, the International Consortium for Blood Pressure, the Million Veteran Program (MVP), and the new Vanderbilt University's biorepository dataset, totalling N = 1,028,980 European-descent individuals, testing ~7.5 million imputed common genetic variants for association with systolic (SBP), diastolic BP (DBP) and pulse pressure (PP).

Results: We assessed all previously reported genetic regions, identifying 1,723 pairwise-independent genetic signals for BP within published loci. After excluding known loci, our GWAS discovered 113 novel genetic regions. Genome-wide conditional analyses revealed 267 new, additional independent significant secondary variants. Overall we report 2,103 independent BP genetic signals. Altogether these associations explain ~40% of the genetic variation in BP, over 50% increase to previous results. We generate polygenic risk scores (PRS) which demonstrate clinically meaningful differences in BP when comparing top versus bottom deciles of the distribution within the independent Lifelines cohort: 12.9 mmHg for SBP ($P = 9.08\times10^{-73}$); exhibiting 5.4-fold increased odds of hypertension ($P = 9.71\times10^{-33}$); with significant improvement in discrimination for hypertension prediction. Forty-one novel BP loci are associated with other diseases.

Our transcriptome-wide analysis enabled the detection of 500 genes previously unreported for BP.

Conclusions: This advances our understanding of hypertension, as a complex, polygenic trait influenced by thousands of genetic variants. Our results identified an established drug target for BP medications (*ADRA1A*) and indicate several genes targeted by other approved medications, providing promising novel gene candidates for drug development or repurposing. We highlight the continuing role of increasingly large genomic datasets for future studies. Our BP-PRS will be publicly available to the global research community.

Disclosures: None

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O–18 The hypertension optimal treatment in children with chronic kidney disease (HOT-KID study): a randomised trial to compare intensive versus standard blood pressure targets on target organ damage in childhood CKD

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Introduction: Optimal target blood pressure to reduce cardiac damage in children with chronic kidney disease (CKD) is unknown.

Methods: Children with pre-dialysis CKD (n = 124), mean eGFR 81.7 (SD 26.8) ml/min/1.73 m^2, were randomised to standard treatment (auscultatory office systolic blood pressure target between the 50th–75th percentiles) and intensive treatment (systolic target <40th percentile). The primary outcome was mean annual difference in left ventricular mass index by echocardiography measured by a blinded observer, with median follow-up of 38.7 (IQR 24.1) months.

Results: Throughout follow-up, mean systolic/diastolic (SD) blood pressure in the intensive-treatment group was 103/60 (10/10) mmHg, z-score 0.06/−0.27 (0.88/1.09) and 107/64 (10/12) mmHg, z-score 0.19/0.004 (0.80/1.16) in the standard-treatment group (all $P < 0.001$ for SBP, DBP). The average annual reduction in left ventricular mass index was similar for intensive and standard treatments: −1.9 g/$m^{2.7}$ (95% confidence interval [CI] −2.45 to −1.34) versus −1.2 g/$m^{2.7}$ (95% CI −1.54 to 0.82, $P = 0.76$). However, at baseline elevated relative wall thickness was more marked than increased left ventricular mass index and a reduction in relative wall thickness was greater for the intensive compared to the standard treatment: −0.01 (95% CI −0.015 to −0.006) versus −0.004 (95% CI −0.0083 to 0.0011, $P = 0.002$). Intensive treatment was not associated with significantly worse renal outcomes or greater adverse effects.

Conclusions: These results suggest that cardiac re-modelling in children with CKD is closely related to blood pressure control. A target office systolic blood pressure at the 50th percentile is close to the optimal target for preventing adverse cardiac remodelling.

Disclosures: None

Reference:

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This trial is registered with ISRCTN, number ISRCTN25006406.

O–19 Personalized electronic record supported optimisation when alone for patients with hypertension- pilot study for remote medical management of hypertension during the Covid-19 pandemic (personal covidBP)

David Collier*[1], Mike Taylor[2], Tom Godec[1], Julian Shiel[1], Rebecca James[1], Yasmin Chowdury[1], Patrizia Ebano[1], Vivienne Monk[1], Mital Patel[1], Jane Pheby[1], Enamuna Enobakhare[1], Amanda Foubister[1], Clovel David[1], Manish Saxena[1], James Siddle[2], Gregor Timlin[2], Paul Goldsmith[2], Nicholas Deeming[3], Neil Poulter[4], Rhian Gabe[5], Richard McManus[6], Mark Caulfield[1]

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Introduction: Hypertension remains a leading cause of disability and preventable death globally. This study tested patient use of a drug-device combination of a smartphone application (App) to record blood pressure (BP), drug (amlodipine) dose and side effects each day at home during the COVID-19 pandemic.

Methods: In this community-based trial with remote monitoring and remote medical management from the investigational site, hypertensive participants aged 18 years + with poor BP control (prior 7 day mean of 135 mmHg systolic BP or above and/or 85 mmHg diastolic BP and above) were enrolled to intervention with open label dose titration over 14 weeks, allowing personalized dosing of liquid amlodipine (1–2 mg steps from 1–10 mg daily). Those with adequate BP control after 7 day baseline recorded BP over the same period.

Results: 205 patients were enrolled into the intervention group between October 2020 and July 2021. Dose-related wanted (BP reduction) and emergence of unwanted effect plots were produced for individual participants. Average BP in intervention fell from 141/87 to 131/81 (difference −10/6 $p < 0.001$) and observation from 125/77 to 124/76 (difference −2/1 $p < 0.001$). Even low doses of 1 or 2 mg amlodipine reduced BP, as did small increments e.g. from 5 mg to 6 mg or from 6 mg to 8 mg. Mean amlodipine dose at study end averaged 5.5 mg on those without amlodipine at baseline, and 7.9 mg in those starting at 5 mg at baseline. Adherence with participant completion of the daily App routines was high and unrelated to age (median >90%).

Conclusions: Remote clinician assessment of twice daily home BP measurements and side effects recorded in the App may inform more precise amlodipine titration and BP control. Personalised dose-response curves for both wanted and unwanted effects may change the relationship of participant and clinician to dose selection, convincement and help optimize long term care.

Disclosures: None

References: None

P–1 The Renin-Angiotensin-Aldosterone system in the pregnant rat

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Introduction: Preeclampsia is the leading cause of maternal and fetal morbidity and mortality in the United States. Women with a history of preeclampsia have an increased risk for developing hypertension, stroke, and ischemic heart disease later in life. It is known that an intact renin-angiotensin-aldosterone system (RAAS) is critical to a healthy pregnancy and that the RAAS is altered in preeclampsia. However, the pathogenic mechanisms of a dysregulated RAAS are largely unknown and a comprehensive examination of RAAS metabolism and receptor expression is lacking in the literature. This work provides basic information needed to understand blood pressure regulation and volume expansion in normal pregnancy, and why it fails to occur in women with preeclampsia, resulting in hypertension and fetal growth restriction.

Methods: We performed equilibrium RAAS Fingerprinting in the plasma and kidneys of LP rats and V rats using a new LC/MS technique. We also performed AT1 receptor binding in the adrenals of virgin (V) and late pregnant (LP) rats.

Results: Using this new method, ANGII levels were decreased in the plasma and unchanged in the kidney of LP animals. This was surprising as it is inconsistent with historical data, however, other methods of measuring ANGII are problematic and often unreliable. There was a very high Aldosterone/ANGII-ratio (AA2) in both plasma and kidney of LP animals. The AA2-ratio provides information about the adrenal aldosterone-releasing response to ANGII. We also found that AT1R expression is unchanged in the adrenals of LP compared to V rats.

Conclusions: These results suggest a systemic down regulation of renal ANGII signaling with intact adrenal signaling. Continuing studies are assessing the RAAS signaling cascade to further validate these data, which may revolutionize the way we think about the RAAS in pregnancy, leading to improved treatment of women with preeclampsia.

Disclosures: None

References: None

P–2 WITHDRAWN

P–3 OMITTED

P–4 OMITTED

P–5 Prevalence of target organ damage in patients with masked hypertension

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Introduction: Masked hypertension (MH) is defined as an in-clinic blood pressure (BP) of <140/90 mmHg, but an elevated out of clinic BP ≥ 135/85 mmHg. Masked uncontrolled hypertension (MUCH) bears the same definition as MH, but the patient is taking antihypertensive medications. Both MH and MUCH are associated with higher incidences of target organ damage (TOD). This study collected data from patients attending the Blood Pressure Unit of St George's Hospital, London to evaluate the prevalence of TOD within patients with MH and MUCH.

Methods: Data regarding demographics, in-clinic and out-of-clinic BP, cardiac and renal changes were collected retrospectively between October 2016 to October 2019. Data for TOD included echocardiogram confirmed left ventricular hypertrophy (LVH), left atrial dilation, left ventricular diastolic dysfunction and abnormal urine albumin-creatinine ratios (UACR).

Results: 184 individuals were included in the study. We found a prevalence of 15.2% for MH and 47.8% for MUCH in 116 patients who had a normal clinic BP and elevated ABPM. 26.7% of patients with MH had LVH, compared to 11.8% of patients with normal BP, a statistically significant result, $p = 0.014$. However, no significant differences were found for other investigated variables of TOD (LV Diastolic dysfunction $p = 0.888$, Left Atrium dilation $p = 0.184$, UACR $p = 0.244$).

Conclusions: Prevalence of TOD is significantly higher in patients with MH or MUCH, when compared to sustained normotensive subjects (both clinic and ABP < 135/85 mmHg). Our study highlights the need for additional studies to further evaluate the prevalence of TOD in these patients, and perhaps suggest a change in the UK NICE guidelines surrounding detection and management of masked hypertension, to improve outcomes for these patients.

Disclosures: None

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P–6 WITHDRAWN

P–7 Hypertension surveillance system evaluation among RTSL sites in Merawi City Administration, Amhara, Ethiopia July 2021

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Introduction: Resolve to Save Lives (RTSL) in collaboration with Federal Ministry of Health, Ethiopia initiated hypertension surveillance system in 2019 on 55 primary health facilities, Merawi City Administration, Amhara Region, Ethiopia. But not evaluated before. This study aimed to evaluate the hypertension (HTN) surveillance system, and provide recommendations.

Methods: We evaluated from July 16 to 27, 2021 in Merawi city administration, North Mecha District, Northwest Ethiopia using semi-structured questionnaires adapted from CDC guidelines (2013) framework. We included the primary hospital and health center (HC), and randomly selected health post (HP). We collected the primary and secondary data through interview of NCD focal, record and report review respectively. Descriptive and narrative summary were used to describe the surveillance system and attributes.

Results: In 2020/21, under the HP 721 (71%) and 29 (18%), HC 5,718 persons (62%) and 458 (31%), hospital 8200 persons (56%) and 866 (37%) and in district 47,356 (97%) and 7,576 (53%) were screened and detected as having raised blood pressure respectively. Of these 58 at HC, 219 at hospital put on treatment. In simple app software a total of 98 and 329 (5 overdue, 1 refusal) patients were registered in HC and hospital respectively. All the respondents perceived that the simple app was secured, simple,

acceptability and useful. But not flexible, stable as depend on the availability of trained personnel. Missing of data in treatment registration, data not analysed by place, person and time, shortage of health care providers identified as a problem.

Conclusions: The overall HTN surveillance system in Merawi city administration is in good progress. But, it requires improvement in the data collection and utilization, quality and completeness of report formats, stability and flexibility of simple app software. We recommend training, supervision, feedback for the health care providers and health informatics.

Disclosures: None

References: None

P–8 Antihypertensive medication reduction detection in Electronic Health Record data: an algorithmic method development

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Introduction: There has been an increased interest in reducing cardiovascular medications in older adults. However, there is currently no consensus on safety and efficacy of this approach. Electronic health record data can be utilised to conduct pharmacoepidemiological studies. Determining antihypertensive medication reduction in large data sets has been proven difficult. Here we describe a new method to detect medication reduction in large data sets.

Methods: This method development obtained data from 1,639,199 patients from the Clinical Practice Research Datalink (CPRD) who were aged 65 and over, who received at least one antihypertensive treatment, from practice up-to-standard (UTS) to latest data collection. We used a novel algorithm approach to detect antihypertensive prescription reduction in prescription data using a prescription recognition pattern. Four basic patterns were established, which were able to flexibly analyse each individual patient from individual cohort entry to cohort exit.

Results: In 1,639,199 (median age: 70.48, female sex: 54%) patients a first incidence of antihypertensive medication reduction was detected in 529,582 (32.3%) patients. The median age in the deprescribing population was 76.25 (IQR: 70.41–82.75) and 300,935 (56%) were female.

Conclusions: These preliminary results show that using an algorithm that can recognise prescription patterns can be used to define antihypertensive medication reduction in electronic health record data.

Disclosures: Drs Sheppard, McManus, and Hobbs were investigators on the OPTiMISE deprescribing trial.

References: None

P–9 Predicting individual risk of muscle disorders in patients eligible for statin treatment: derivation and validation of STRATIFY-StatinMD prediction model

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Introduction: Muscle-related adverse events have caused considerable concern when considering statin treatment for prevention of cardiovascular disease. This study aimed to develop a prediction model for an individual's risk of muscle disorders to support clinical decision making in routine primary care.

Methods: This was an observational cohort study using data from patients in England contributing to the Clinical Practice Research Datalink (CPRD). Males aged over 50 and females aged over 60 (potentially eligible for statin treatment), were followed-up for hospitalisation or death with a diagnosis of muscle disorders within ten years. Patients' demographics, health risk factors, co-morbidities and medications including statins were selected as predictors based on previous literature and expert opinion. The model was derived in the CPRD GOLD using the Fine-Gray sub-distribution hazards approach, taking account the competing risk of death. The model was externally validated in patients from the CPRD Aurum, examining discrimination by the C statistic and calibration by the observed/expected ratio (O/E) and calibration slope.

Results: The cohort for model derivation included 1,785,207 patients, with a mean age of 64 and 44% females. Patients prescribed statins were predicted to have a higher risk of muscle disorders. Female sex, obesity, frailty, smoking, previous muscle problems, liver diseases, vitamin D deficiency and concomitant myotoxic medications also increased the risk. The external validation in 3,889,504 patients showed a good model discrimination (C statistic 0.782, 95%CI: 0.781–0.783) and calibration (O/E 0.87, 95%CI: 0.86–0.88; calibration slope 1.06, 95%CI: 1.05–1.07) for ten-year prediction. Similar model performance was observed at one and five years.

Conclusions: This model accurately predicted an individual's risk of muscle disorders based on commonly recorded patient characteristics and medical history. It could be used in conjunction with existing cardiovascular risk calculators to weigh up the benefits and harms of statin treatment in clinical practice.

Disclosures: None

References: None

P -10 Levels of undiagnosed and uncontrolled hypertension in Wales: results from May Measurement Month 2017, 2018 and 2019 blood pressure screening campaign

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Introduction: Globally, it is estimated that 10.4 million people die each year due to raised blood pressure (BP). Unfortunately, at least 40% of those with high BP globally are unaware of their condition. In 2019, the UK and Republic of Ireland May Measurement Month (MMM) BP awareness campaign reported levels of undiagnosed hypertension and uncontrolled hypertension as (66.5% and 61.8%, respectively)[1]. However, community-based levels of undiagnosed hypertension, and the proportion of patients with uncontrolled hypertension have never been reported for Wales.

Methods: Screening sites were set up within community settings across Wales at GP surgeries, pharmacies, workplaces, gyms, places of worship and public places. Questionnaires were used to record participant demographics, lifestyle and medical history. Three BP measurements were recorded and an average of

the 2nd two readings used for analyses. MMM data from 2017, 2018 and 2019 were combined for analysis. Those classified as "hypertensive" were those with (systolic BP ≥ 140 mmHg and diastolic BP ≥ 90 mmHg) or on anti-hypertensive medication.

Results: The campaign screened 5,584 participants (mean age 64 ± 13 years, 57.1% women). Of those screened, 1,496 (26.8%) were hypertensive. Of those who were hypertensive, 876 (58.5%) were unaware of their condition. 523 (35%) of hypertensive participants were on anti-hypertensive medication, with 268 (51.2%) of those taking medication presenting with uncontrolled hypertension (systolic BP ≥ 140 mmHg and diastolic BP ≥ 90 mmHg).

Conclusions: These community-based data demonstrate for the first time the proportion of undiagnosed hypertension and uncontrolled hypertension in Wales. These data highlight a critical need for a systematic BP screening and monitoring programme in Wales to prevent future cardiovascular events.

Disclosures: None

Reference:

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P–11 WITHDRAWN

P–12 Difference and correlation of daytime and nighttime short term blood pressure variability using 24-hour ambulatory blood pressure monitoring

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Introduction: Blood pressure variability (BPV) has been shown to correlate with various markers and clinical outcome, while blood pressure (BP) is known to be affected by environments and daily activities.[1] The current study focuses to investigate the difference and correlation of daytime and nighttime BPV using 24-hour ambulatory blood pressure monitoring (ABPM).

Methods: Subjects were prospectively recruited from community health program. ABPM was performed with measurement interval of 30 minutes for 24 hours. Subject diary was used to record sleep and awake time. Standard deviation (SD), average real variability (ARV) and coefficient of variation (CV) were used to calculate BPV. Evaluation of BPV were done on systolic (S) BP and diastolic (D) BP separately. Daytime and nighttime BPV were compared using paired t-test. Pearson's correlation test was used.

Results: The current study included 45 subjects, with mean age of 61.2. Twenty of them (44.4%) were self-reported with hypertensive diagnosis. Mean 24-hour BP was 121/73 mmHg (daytime: 124/76, nighttime: 114/68). Fifteen (33.3%) were screened with 24h BP ≥ 130/80 mmHg. Daytime and nighttime BPV were generally similar, except that significant difference was detected with SBP using SD (difference = 1.2 mmHg, p = 0.022). Daytime and nighttime BPV were positively correlated using SD and ARV for both SBP and DBP (ranges of R 0.31–0.45). Positive trend of correlation was also detected in BPV using CV but failed to achieve statistical significance (p-value for SBP = 0.059; p-value for DBP = 0.071).

Conclusions: BPV was shown to be consistent during daytime and nighttime, which implies BPV is less affected by daily activities. Daytime and nighttime BPV were generally positively correlated.

Disclosures: All authors declared no competing interests.

Reference:

1. Kario K, et al. J Clin Hypertens (Greenwich). 2019;21(9):1250-1283. https://doi.org/10.1111/jch.13652.

P–13 Comparison of blood pressure monitoring from elderly community centres and at home under COVID-19 pandemic

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Introduction: Under the COVID-19 pandemic, lockdown measures have been implemented in various countries in response to elevating number of confirmed COVID-19 cases. While there was only limited service from face-to-face community health program on BP management, home BP (HBP) monitoring was promoted. The current study aims to investigate (1) control of BP under the lockdown measures; (2) difference of BP from community health centre and home.

Methods: Participants enrolled in the program since July2020, with automated BP measurement from elderly community centres collected as centre BP. In response to COVID-19 outbreak in November2020 in Hong Kong, service from health program was limited and HBP measurement was promoted since December2020 (pre-section: July-December2020). Service from community health centre was resumed in February2021. One-month run-in period was allowed. Subjects were followed up until December2021 (post-section: March-December2021) BP was compared on (1) centre BP between pre- and post-section, and (2) centre BP and HBP during post-section.

Results: A total of 414 subjects were included in the study, with a mean age of 71.0. Three hundred and eight of them (74.4%) were reported with hypertension diagnosis. Mean centre BP was 135/73 for pre-section and 131/71 for post-section, while mean HBP was 123/70. Centre BP was significantly lower at post-section compared to pre-section, while HBP was significantly lower than centre BP during the post-section. The differences remained consistent regardless of hypertension status.

Conclusions: There was no worsening of BP management during the COVID-19 outbreak. Despite long term use of automated BP measurement at elderly community centres, white coat effect persisted as demonstrated by difference between centre BP and HBP. HBP shall be preferred for BP management.

Disclosures: The community health program is funded by the Hong Kong Jockey Club Charities Trust. All authors declared no competing interests.

References: None

P–14 WITHDRAWN

P–15 A survey of the user acceptability of the Omron HEM-9601T NightView monitor

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Introduction: Most out-of-office blood pressure monitoring in UK primary care is performed using Home Blood Pressure Monitors (HBPM). NICE recommend Ambulatory Blood Pressure Monitoring (ABPM) as day-time only.[1] 24-hour ABPM can detect nocturnal hypertension and HBPM cannot. The Omron HEM-9601T Night-View Monitor is a wrist cuff device that can take three measurements during night-time and has been validated.[2] We conducted a questionnaire survey of patients loaned the NightView.

Methods: NECS Newcastle granted permission for a local service evaluation of the monitor. 26 patients were asked to complete a questionnaire. People with atrial fibrillation were excluded.

Results: 13 people did not use the device at night, of which 11 found it easy to use and one could not use it due to his Parkinsonian tremor. Of the 13 night-time users, none had a sleep disorder, 5 had hypertension and the average age was 60 years. 9 people woke during the night, 4 blamed the cuff inflation and 5 needed to go to the toilet. 10 people found the device easy to use and 2 found it difficult. 8 found the app easy to use and 1 found it very difficult. 11 of the night-time users would recommend the NightView and 2 would not.

Conclusions: For the majority of people, the use of the NightView is acceptable and it did not wake them up. This unique device offers the opportunity to measure nocturnal blood pressure without using 24-hour ABPM.

Disclosures: MD and TM have received lecture fees from Omron.

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P–16 New options for treating people with hypertension and intolerance to statins; a primary and a secondary prevention case history

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Introduction: 16% of people report intolerance to all statins in clinical practice. In the statin randomised control trials this was 7%. The difference might be explained by the 'nocebo effect'.[1] New treatments are available for people who require both primary and secondary prevention measures.

Results: Case history 1-SR diagnosed with Frederickson type IIb familial hypercholesterolaemia in 1991, when aged 21. Could not tolerate simvastatin and treated with bezafibrate, then ezetimibe added. Hypertension diagnosed 2010. Joined bempedoic acid CLEAROutcomes study in 2019 and developed side effects to run-in placebo. Surprised when told it was a placebo. In 2021 he accepted bempedoic acid on prescription and tolerates it. Dutch Lipid Network Score (DLNS) = 6.

Case history 2 - JF diagnosed with hypertension 2009, aged 32. In early 2017 QRisk2 score = 15.76. Later in 2017 diagnosed with ischaemic heart disease, impaired left ventricular function and undergoes carotid endarterectomy. Could not tolerate two statins and treated with ezetimibe alone. 2018 coronary artery bypass graft. 2019 diagnosed with CKD3. 2021 given first subcutaneous injection of inclisiran. DLNS > 6, therefore referred for genetic studies.

Conclusions: Both of these patients represent high risk from an early age, but QRisk2 misrepresented that risk. Bempedoic acid blocks adenosine triphosphate-citrate lyase. Inclisiran is a small interfering RNA that inhibits PCSK9. There is NICE approval for both drugs, TA694 and TA733. Neither drug has clinical outcome data, but CLEAROutcomes is expected to report later this year. Both patients achieved a substantial reduction in LDL-C.

Disclosures: Both patients have given consent for their case histories to be used. TM has received research grants and advisory fees from Daiichi-Sankyo, Esperion and Novartis.

Reference:

1. Wood, Frances A., et al. "N-of-1 trial of a statin, placebo, or no treatment to assess side effects." *New England Journal of Medicine* 383.22 (2020): 2182–2184.

P–17 – P 20 OMITTED

P–21 Variability in salt sensitivity after oral salt loading in a healthy volunteer cohort

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Introduction: Individuals have different blood pressure (BP) responses to changes in salt intake. This is referred to as salt sensitivity (SS) and is an independent risk factor for cardiovascular disease. SS can be defined as a change in mean arterial pressure (MAP) of ≥10 mmHg when salt balance is altered by diet or diuretics or a 5% rise in BP after oral salt-loading test (OST). The aim of this post-hoc data analysis from the LINKED (investigation of the impact of germ Line variation IN the K channel KCNJ5 on the rEnin-angiotensin axis and aIDosterone release in human subjects) study was to assess SS and its variability after OST using 24hr ambulatory BP monitoring (ABPM).

Methods: 58 healthy Caucasian volunteers (age: 59 ± 11 years (21–77), 60% females) recruited through the local NIHR BioResource, underwent OST i.e., a low salt diet (Na+ equivalent <100 mmol/L) for 7 days followed by 7 days of moderate-high salt intake by addition of salt tablets (Na+ equivalent ≥100 mmol/L). 24hr-ABPM, 24hr-urine electrolytes, and biochemistry were measured before and after OST, SS defined as 5% rise in MAP.

Results: Post salt-loading, a mean rise in 24hr urinary Na+ of 136 ± 70 mmol/L, and a rise of >90 mmol/L in 72% participants was noted. The corresponding mean rise in MAP based on total, day, and night average ABPM was 1.8 ± 4.6, 1.5 ± 5.5, 1.7 ± 7.5 mmHg, with inter-individual co-efficient of variation of 83%, 92% and 86% respectively. Overall, 46% met SS criteria, 14% of cases based on night-time BP alone. Rise in MAP correlated with age (R = 0.433 p-value = 0.001).

Conclusions: The causes for the inter-individual, and diurnal variability in SS are probably multifactorial including age-dependant physiology, genetic-predispositions, and possibly partial adherence to OST requirements. This highlights a need for simpler, personalised methods for assessment and translation of SS in real-world cohorts.

Disclosures: None

References: None

P–22 A feasibility study examining the prescription of isometric exercise training for blood pressure management using rating of perceived exertion

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Introduction: Isometric exercise training (IET) has been shown to reduce blood pressure (BP). Current IET prescription requires delivery from a trained healthcare professional (HCP). There is increasing evidence supporting the efficacy of rating of perceived exertion (RPE) to accurately prescribe exercise intensity. We aimed to examine the effect of RPE prescribed IET vs. HCP prescription and control group upon BP.

Methods: 30 participants with normal-high-normal BP were randomised into a HR-Exercise (HR-Ex), RPE-Exercise (RPE-Ex) or CON group. IET intervention groups undertook a 4-week home-based wall-squat programme with intensity prescribed either by a HCP using the heart rate method (HR-EX)[1], or self-prescribed using a RPE selection protocol (RPE-EX) and the CON group maintained their normal lifestyle. Clinic BP was measured at baseline and post IET.

Results: Clinic SBP, DBP and MAP were significantly reduced ($P < 0.001$) in both intervention groups, following IET compared to baseline. Group mean reductions for the HR-EX (SBP: -14 ± 6, DBP: -6 ± 4, MAP: -8 ± 4 mmHg) and RPE-EX (SBP: -9 ± 6, DBP: -6 ± 4, MAP: -6 ± 3 mmHg) were greater ($P \leq 0.001$) than the CON group. There were no differences between intervention groups in the magnitude of the BP reductions ($P > 0.05$); however, at baseline HR-EX had greater SBP ($P < 0.001$) and MAP ($P = 0.001$) results compared to RPE-EX, but after the interventions there were no differences between groups ($P > 0.05$).

Conclusions: Results confirm the effectiveness of the previous wall-squat methodology and demonstrate the potential of this new, more accessible, RPE based method, as an effective lifestyle intervention to lower BP.

Disclosures: None

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P–23 Is adherence with current UK and US blood pressure targets associated with receipt of recommended first-line pharmacological therapy and lifestyle factors?

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Introduction: A number of non-pharmacological/lifestyle factors (e.g., excess alcohol intake, eating an unhealthy diet, being overweight, being physically inactive) are known to be associated with hypertension and interventions to reverse these have been shown to have a positive impact on blood pressure control and thus CVD risk. The objective of the study was to determine in hypertensive patients aged 55 to 79 years if there is an association between achieving target BP control as determined by NICE and the AHA and a) receipt of recommended first-line antihypertensive pharmacological therapy, and b) non-pharmacological/lifestyle risk factors.

Methods: 185 consecutive patients aged ≥ 55 and < 80 years with a diagnosis of hypertension as per NICE guidelines (BP ≥ 140/90 mmHg at diagnosis) were selected for this retrospective service evaluation. Patient records were reviewed with regards to smoking, diet, exercise, physical activity, alcohol consumption and BMI and adherence to NICE hypertension guidance regarding first-line pharmacological therapy. Associations between the distribution of these factors and groups based on blood pressure control on treatment were sought. Statistical significance was assessed using the chi square and Mann-Whitney tests.

Results: Of the modifiable non-pharmacological/ lifestyle risk factors examined only BMI gave a statistically significant outcome (Mann Whitney; $p = 0.038$), with a lower BMI being observed in the group that achieved the best BP control (BP < 130/80 mmHg) (Mann Whitney; $p = 0.038$). Adherence to NICE hypertension guidance with respect to first-line pharmacological therapy prescribed was not found to influence blood pressure control ($p > 0.050$).

Conclusions: Those patients who meet the AHA BP target of < 130/80 mmHg have a significant lower BMI than those who do not suggesting interventions to reduce BMI may improve blood pressure control.

Disclosures: None

References: None

P–24 Perceptions of healthcare professionals on the feasibility and implementation of a novel isometric exercise intervention for Stage 1 hypertension management

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Introduction: Isometric exercise (IE) in laboratory settings can lower resting blood pressure in people with hypertension for clinical effect (1). Empowering patients to manage their condition is key and short, simple, IE may enable this (2). We explored perceptions of healthcare professionals on the delivery of an IE intervention to manage Stage 1 hypertension in the NHS (3).

Methods: Qualitative sub-study within a randomised, controlled feasibility study of an IE intervention for stage 1 hypertension (3). Qualitative interviews ($n = 6$) with healthcare professionals were thematically analysed to understand feasibility and implementation.

Results: Using IE to support hypertension management was viewed positively, however, evidence of clinical effectiveness was key for implementation. Professionals felt IE would be well received by patients, despite concerns around compliance and accessibility. It was deemed well suited to delivery by diverse professional roles e.g., physiotherapists. Barriers to implementation included concerns due to overwhelming post-covid service demand, IE being out of the 'comfort zone' for GPs and requiring specific training for IE delivery. Apprehension for use as a first-line lifestyle treatment option was apparent; however, all felt strong clinical effectiveness evidence would mitigate this.

Conclusions: Implementing an IE intervention in NHS primary care for Stage 1 hypertension is feasible, however, definitive effectiveness evidence and appropriate training is needed.

Disclosures: Funded by the NIHR Research for Patient Benefit programme. Views are those of the authors and not necessarily the NIHR, NHS or the UK DHSC.

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P–25 Retrospective analysis on diagnostic imaging and secondary causes of hypertension for young adults referred to a tertiary hypertension clinic

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Introduction: Early-onset hypertension is associated with higher cardiovascular events and all-cause mortality(1). Secondary causes of hypertension account for around 5% of hypertension in young adults(2). NICE (NG136) advocate referral for hypertensive patients under 40 years(3). However, there is a lack of consensus around whether all young adults should undergo cross-sectional imaging (CT or MRI) to rule out secondary causes.

Methods: This retrospective service evaluation included newly referred adults aged 18−40 years at a tertiary hypertension clinic (Addenbrooke's Hospital, Cambridge, UK). Electronic patient notes were used to extract data on demographics, past medical/drug history, risk factors, blood pressure and secondary investigations. 274 patient records were reviewed between 2017 and 2019. 23 were excluded due to normotension (10), white coat hypertension (4) and failure to undergo any investigations (9).

Results: 251 patients (143 males, 108 females) with a mean age of 33 ± 6 years (male) and 32 ± 6 years (female) were included in the final analysis. 76% of males and 60% of females had a BMI > 25 kg/m^2 (mean BMI 28.4 ± 5.0 kg/m^2 males; 31.2 ± 7.4 kg/m^2 females). The mean attended office blood pressure was 140/90 ± 16/12 mmHg (males) and 140/93 ± 16/13 mmHg (females) at the first clinic appointment (~60% on antihypertensive treatment). 57% of patients underwent cross-sectional imaging. 12/143 (8.4%) males and 12/108 (11.1%) females were diagnosed with a secondary cause of hypertension. Causes were primary hyperaldosteronism (4), underlying renal pathology (4), exogenous steroids (3), combined contraceptive pill (3), renal artery stenosis (2) and cocaine use (2).

Conclusions: Even when the clinical or biochemical suspicion is low, a comprehensive evaluation (including cross-sectional imaging) for secondary causes of hypertension in young adults is crucial. Interventions for secondary hypertension are potentially curative and their early identification may, therefore, avoid lifelong and unnecessary treatment.

Disclosures: None

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P–26 OMITTED

P–27 Reliability of blood pressure measured by parents in young children at Home using hand-held doppler device and aneroid sphygmomanometer for systolic blood pressure measurement (HDBPM)

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Introduction: Our objectives in this clinical study were to evaluate the reliability of systolic BP values measured at home by parents of children aged <5 years (Home-SBP$_{Doppler}$) over a 2-week period; and (ii) to compare Home-SBP$_{Doppler}$ with doppler systolic BP measured in clinic by health professional in the hospital at a single visit (Office-SBP$_{Doppler}$).

Methods: At the time of an educational session, we taught parents to measure systolic BP and assessed their technique using a hand-held doppler device and aneroid sphygmomanometer. Using doppler device and BP instrument, we requested parents to perform three consecutive BP measurements twice daily (ideally morning and evening around similar times) when the child was awake, settled and cooperative.

Results: HDBPM measurements were available for 48 children, mean age ± SD of 2.2 ± 1.5 years and 29% on antihypertensive medication. Office-SBP$_{Doppler}$ was 3.0 ± 8.8 mmHg higher than Home-SBP$_{Doppler}$ (P = 0.41 between means). Six children displayed a marked white coat effect with Office-SBP$_{Doppler}$ > 10 mmHg higher than Home-SBP$_{Doppler}$, of whom five were under 18 months. Excluding these patients from the analysis reduced the mean difference between Office-SBP$_{Doppler}$ and Home-SBP$_{Doppler}$ to 0.6 ± 6.5 mmHg (P = 0.82). Mean SBP was similar between week 1 and week 2 HDBPM measurements with 0.15 ± 3.77 mmHg difference between week 1 and week 2 readings (P = 0.85). Morning HDBPM measurements were lower than evening with mean difference −2.48 ± 3.84 mmHg, although this difference did not achieve significance (P = 0.18).

Conclusions: HDBPM is a reliable method for measuring systolic BP in young children with BP levels comparable to those performed by health professional in clinic. Young children show a white coat effect and variation of BP levels through the day.

Disclosures: None

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P–28 Measurement of systolic BP using a hand-held Doppler device and aneroid sphygmomanometer in children: comparison with office-based auscultatory SBP measurement

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Introduction: To compare values of office systolic BP (SBP_{Office}) and systolic BP measured using doppler device ($SBP_{Doppler}$) by health professional in the hospital at a single visit.

Methods: In all patients, auscultatory office BP was measured followed by office BP measurement, a hand-held doppler device and the same equipment were used to measure systolic BP ($SBP_{Doppler}$) by the health professional. The mean of three values was used.

Results: Single centre observational study including $n = 180$ children, median (interquartile range) 4.95 (2.32, 11.77) years, including $n = 91 < 5$years. Systolic BP obtained by health professional in the hospital using doppler device were highly correlated with manual office measurement, SBP_{Office} vs. $SBP_{Doppler}$ ($r = 0.975$, $P < 0.001$). The mean SBP_{Office} was 106.4 ± 16.2 mmHg and mean $SBP_{Doppler}$ was 105.1 ± 15.7 mmHg. For those <5 years, the mean SBP_{Office} was 97.3 ± 12.6 mmHg and mean $SBP_{Doppler}$ was 97.1 ± 12.5 mmHg. Bland–Altman analysis revealed a small difference in the estimation of systolic BP by the two methods. The difference in absolute values between the SBP_{Office} and $SBP_{Doppler}$ was 1.26 ± 3.4 mmHg [95% confidence interval (CI), 0.76 to 1.75, $P = 0.455$] and 0.23 ± 2.7 mmHg [95% confidence interval (CI), −0.32 to 0.77, $P = 0.904$] for all patients and <5 years respectively. The coefficient of variation for $SBP_{Doppler}$ was less than 2.3%, suggesting excellent repeatability of measurements.

Conclusions: These data suggest that across the childhood age range, including the youngest children, the mean difference was low with a low SD reflecting good agreement between these methods (auscultation and using doppler device) when measured in clinic by health professional. Our results, therefore, suggest that SBP can be determined by hand-held doppler device with similar accuracy to the "reference" auscultatory method.

Disclosures: None

References: Newton J, Singh C, Sinha MD. Measurement of SBP at home by parents using hand-held Doppler device and aneroid sphygmomanometer: a single-centre experience. J Hypertens. 2021; 39(5):904–910.

P–29 Identifying adolescents with Turner Syndrome at risk of poor cardiovascular outcomes: a pilot study

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Introduction: Hypertension can develop at a young age in Turner Syndrome (TS), and International Guidelines recommend that blood pressure (BP) is measured at every clinic visit during childhood.(1) 24-hour ambulatory BP monitoring (ABPM) is perceived as being poorly tolerated in paediatric patients, but has diagnostic benefits. Its usability and accuracy in TS are scarcely established. We compared information gathered from clinic BP with ABPM.

Methods: Adolescents with genetically confirmed TS undertook both clinic BP measurement and ABPM (Welch Allyn®, USA). The study has ethics approval (REC 21/SC/0292) and parents/patients gave informed consent/assent.

Non-dipping BP was defined as <10% nocturnal fall in systolic and/or diastolic BP from daytime values. Hypertension was defined as systolic and/or diastolic BP ≥ 95th centile for height, age and gender.(2) Acceptability of ABPM was assessed using a 10-point Likert score (1 unacceptable, 10 acceptable).

Results: Initial data were collected from six girls (mean age±SD 15.0 ± 1.5 years). Successful ABPM readings were obtained from $81 \pm 12\%$ measurements. Clinic BP identified hypertension in one participant and one further participant was diagnosed with hypertension based on ABPM. Non-dipping BP was observed in 5 of 6 participants: 3 had systolic non-dippings (median 8.7%, IQR 6.6%–11.5%), 4 had diastolic non-dippings (median 8.5%, IQR 7.7%–12.4%). Mean arterial BP nocturnal dipping was <10% in the same 5 participants (median 6.2%, IQR 5.8%–9.0%). Average acceptability score for ABPM was 6.6 ± 1.2 for the daytime and 6.2 ± 2.2 for the night-time.

Conclusions: Clinic BP may not accurately assess for the true cardiovascular risk of adolescents with TS. ABPM was rated as an acceptable investigation by patients and improves hypertension detection in TS.

Disclosures: None

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P–30 WITHDRAWN

P–31 Left ventricular longitudinal myocardial systolic dysfunction in patients with resistant hypertension

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Introduction: The association between hypertension and subclinical left ventricular (LV) myocardial dysfunction is well established. However, the assessment of subclinical LV myocardial dysfunction in patients with resistant hypertension (RH) using two-dimensional speckle tracking echocardiography (2D-STE) has not been fully investigated.

Methods: 32 participants:10 with RH (64 ± 12years), 11 with controlled hypertension (CH) (61 ± 12years) and 11 normotensive controls (NC) (52 ± 14years) were recruited. Participants underwent anthropometric measurements, resting blood pressure (BP) assessment and 2D transthoracic echocardiography. Global longitudinal strain (GLS) was measured using 2D-STE to assess for subclinical LV dysfunction. Categorical variables and continuous variables were compared using a Chi-square test and one-way ANOVA with Tukey's post hoc analyses, respectively.

Results: Experimental groups were matched by age, gender, ethnicity and body mass index ($P > 0.05$). Patients with RH demonstrated higher office systolic and diastolic BP readings

compared to CH and NC (165/105 mmHg vs 128/83 mmHg and 116/80 mmHg, $P < 0.001$). Duration of hypertension and utilisation of antihypertensive medications were comparable in both hypertensive groups ($P > 0.05$), except for diuretic use which was higher in RH (100% vs 18.2%, $P < 0.001$). Indexed LV mass and left atrial volume were higher in RH compared to NC (100.1 ± 17.4 g/m^2 vs 73.6 ± 14.3 g/m^2, $P = 0.003$ and 29.4 ± 7.4 ml/m^2 vs 20.9 ± 3.6 ml/m^2, $P = 0.006$, respectively) but were not different to CH (100.1 ± 17.4 g/m^2 vs 87.3 ± 17.7 g/m^2, $P = 0.20$ and 29.4 ± 7.4 ml/m^2 vs 25.4 ± 5.8 ml/m^2, $P = 0.26$, respectively). Although ejection fraction was similar between RH, CH and NC ($63 \pm 7\%$ vs $63 \pm 4\%$ vs $65 \pm 4\%$, $P = 0.56$), GLS was markedly reduced in both RH and CH compared with NC ($-17.1 \pm 1.2\%$ and $-19.7 \pm 1.2\%$ vs $-22 \pm 1.6\%$, $P < 0.001$), with significant reduction in patients with RH compared to the CH ($P < 0.001$).

Conclusions: Patients with RH show evidence of greater cardiac remodelling and concomitant impairment of LV longitudinal myocardial function when compared to patients with CH. Early identification of subclinical myocardial dysfunction in RH patients may have important prognostic and therapeutic implications.

Disclosures: None

References: None

P–32 WITHDRAWN

P–33 Ethnic disparities in left ventricular diastolic function in hypertension: a dual ethnic cohort study

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Introduction: Compared to white individuals, black subjects have higher incidence of heart failure with preserved ejection fraction (HFpEF) [1,2] in which diastolic dysfunction is the main abnormality. However, it is debated if the development of diastolic dysfunction is affected by ethnicity. Here we test whether there are ethnic differences in diastolic function in a dual ethnic cohort of subjects with hypertension and no evidence of HFpEF.

Methods: Hypertensive individuals and self-defined ethnicity as "black" and "white" were recruited in the UK and Italy. Hemodynamic measurements, biochemistry investigations and transthoracic echocardiography were performed. Diastolic function was assessed using the ratio of early (E)) and late (A) transmitral filling velocity (E/A) and the ratio of E and tissue Doppler early diastolic velocity (E/e').

Results: 283 black (47% male) and 378 white (65% male) subjects were recruited. Compared to white individuals, black subjects were younger (mean ± SD) (49 ± 11 years vs 55 ± 14 years), had higher blood pressure (BP) ($155/94 \pm 14/11$ mmHg vs $139/85 \pm 16/11$ mmHg), lower incidence of dyslipidaemia and diabetes (21 % vs 41 % and 11% vs 19% respectively), all $P < 0.01$. E/A was similar between black and white subjects (1.02 ± 0.41 vs 1.01 ± 0.53 respectively, $P > 0.9$) but E/e' was higher in black compared to white individuals (9.4 ± 2.9 vs 8.5 ± 2.4 respectively, $P < 0.01$). This difference persisted after adjustment for age, sex, BP, heart rate, duration of hypertension, pharmacological treatment, body mass index, diabetes, dyslipidaemia, previous cardiovascular event, left ventricular mass and left ventricular ejection fraction (estimated mean ± SE 9.3 ± 0.18 vs 8.5 ± 0.16 respectively, $P = 0.005$)

Conclusions: Diastolic function differs between black and white individuals even after adjustment for confounding factors. Ethnicity could affect myocardial susceptibility to diastolic dysfunction as part of the hypertension-mediated organ damage.

Disclosures: None

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P–34 The sympathetic control of resting blood pressure in premenopausal and postmenopausal women with primary hypertension

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Introduction: In healthy adults, the blood pressure (BP) response to a given level of sympathetic activity (sympathetic transduction) is lower in premenopausal women versus young men. This could explain the lower hypertension prevalence in young women compared to men. However, whether premenopausal hypertension is associated with increased sympathetic transduction is unclear. We aimed to determine whether sympathetic transduction differed in premenopausal and postmenopausal women according to hypertension status.

Methods: Eighteen premenopausal (8 hypertensive) and 27 postmenopausal women (12 hypertensive) gave written informed consent to participate. Muscle sympathetic nerve activity (MSNA; microneurography), BP (Finometer) and ECG were recorded simultaneously. Sympathetic transduction was quantified as the weighted linear regression slope between MSNA area (integrated neurogram modulus during two cardiac cycles) and subsequent changes in diastolic BP, using an established method [1]. Group differences were determined by unpaired T-test or Mann-Whitney U test. Data are mean ± SD or median [IQR].

Results: Participants were matched for age (hypertensive versus normotensive: premenopausal 44 [9] versus 34 [21] years, $P = 0.146$; postmenopausal 56 [9] versus 62 [11] years, $P = 0.148$) and resting MSNA (premenopausal 57 [22] versus 59 [15] bursts/100 heartbeats, $P = 0.762$; postmenopausal 80 ± 13 versus 77 ± 9 bursts/100 heartbeats, $P = 0.522$). Sympathetic transduction slope was greater in hypertensive versus normotensive premenopausal women (0.22 [0.16] versus 0.09 [0.03] mmHg/%.s, $P = 0.027$) but not postmenopausal women (0.08 [0.12] versus 0.09 [0.06] mmHg/%.s, $P = 0.683$). Furthermore, when participants were grouped by hypertension status, sympathetic transduction slope was negatively correlated with age in hypertensive women (Spearman's rho $= -0.551$, $P = 0.014$) but not in normotensive women (Spearman's rho $= -0.035$, $P = 0.868$).

Conclusions: These data suggest that premenopausal but not postmenopausal hypertension is associated with increased sympathetic transduction. This is evidence that elevated sympathetic transduction may contribute to hypertension in premenopausal women.

Disclosures: None.

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1. Briant, L.J.B., et al., 2016. J Physiol. 594(17): p. 4753-4768. https://doi.org/10.1113/JP272167

P–35 Hypertension is the strongest predictor of coronary artery disease detected on CT coronary angiography

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Introduction: The current national guidelines do not address for the inequity between the increasing demand of CTCA and the contrasting limiting capacity of the hospitals. In this study, the indications for CTCA referrals are reviewed, to identify the strongest predictors of coronary artery disease (CAD), as seen on angiography.

Methods: A retrospective study, reviewing the individual electronic health records of 566 consecutive patients who underwent CTCA between July and November 2020, was conducted. TAVI studies and graft assessment studies were excluded. A total of 485 patient (mean age 60.4) reports were analysed. All risk factors were recorded including smoking (23%), hyperlipidaemia (37%), positive family history (22%), systemic hypertension (51%), diabetes mellitus (30%) and male gender (50%). Referral criteria were also recorded for statistical analyses. Ethnicity, cardiac and past medical history were also recorded.

Results: Of the 170 patients with moderate-severe CAD, 127 (74.7%) had hypertension, and of the 100 patients with severe CAD, 78 (78%) had hypertension. Univariate analysis for comparison of patients with none ($n = 222$), mild ($n = 93$), moderate ($n = 70$) and severe ($n = 100$) CAD revealed that hypertension ($P < 0.001$), diabetes ($P = 0.007$), gender ($P < 0.001$), dyslipidaemia ($P < 0.001$) and smoking ($P = 0.005$), were all significantly associated with the presence of CAD on CTCA. However, multivariate analysis using a multiple logistic regression model, confirmed a significant association between hypertension and CAD ($OR = 1.26$, $P < 0.001$).

Conclusions: Hypertension is the strongest independent predictor for the presence of CAD detected on CTCA, amongst diabetes, gender, dyslipidaemia, positive family history and smoking. Further studies relating our results to the CTCA reports of same patients after a few years of aggressive hypertension treatment, would prove essential in establishing the role of blood pressure management in the progress of angiographic coronary disease.

Disclosures: None

References: None

P–36 The relation of hypertensive response to exercise in subjects with high normal blood pressure linking with the development of hypertension

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Introduction: Trends in hypertension prevalence in subjects with high-normal blood pressure (BP) assessed by their performance in treadmill exercise test parameters, through BP response to exercise, as also their sympathetic nervous system activity and arterial stiffening.

Methods: 100 consecutive subjects with high normal BP [systolic BP = 130–139 mmHg and/or diastolic BP = 85–89 mmHg], underwent a negative for ischemia treadmill exercise test (Bruce protocol). Arterial stiffness was evaluated based on carotid-femoral pulse wave velocity (PWV). Sympathetic drive was assessed by muscle sympathetic nerve activity (MSNA). Follow-up was scheduled every 6 months for 3 consecutive years, where BP measurements were assessed in office and with ambulatory BP monitoring (ABPM). All participants offered lifestyle advise. Endpoint was development of hypertension (HTN) either with Office BP or ABPM.

Results: From 100 subjects (54 ± 8 years, 42 males, baseline office BP: 132/82 mmHg, ABPM: 122/76 mmHg) 40 developed HTN. Hypertensives demonstrated higher BP response at both 1st stage (160vs147 mmHg, $p = 0.068$) and 2nd stage (181vs164 mmHg, $p = 0.035$) of Bruce protocol. A novel metric, SBP/MET-slope [(peakSBP—restingSBP)/(peakMET-1)] revealed a statistically significant higher slope in all stages till peak exercise (stage1: 6.25vs4.25 $p = 0.05$, stage2: 7.6vs5.3 $p = 0.03$, peak: 7.22vs5.1 $p = 0.035$). Additionally, hypertensives exercise capacity was reduced (10vs11.5METs, $p = 0.01$), as their maximum exercise heart rate (154vs164, $p = 0.001$). They demonstrated higher levels of PWV (8.35vs7.5 m/sec, $p = 0.043$) and MSNA levels (37vs31 bursts, $p = 0.04$), while did not differ regarding their metabolic profile at the follow-up. Interestingly in their initial ECG demonstrated shorter P-wave duration (101.3vs93.2, $p = 0.013$) and QRS duration (93.4vs85.7, $p = 0.006$). In ABPM they developed higher night systolic BP (116vs112 mmHg, $p < 0.04$).

Conclusions: In participants with high normal BP, a state of increased sympathetic overdrive and increased arterial stiffening lurks. Exercise testing provides a prognostic value as a hypertension screening tool acknowledging a state of increased systemic vascular resistance leading to development of hypertension.

Disclosures: None

References: None

P–37 OMITTED

P–38 WITHDRAWN

P–39 Orthostatic hypertension and the risk of major adverse events: A systematic review and meta-analysis

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Introduction: Evidence on whether orthostatic hypertension (OHT) is a risk factor for adverse events is inconclusive. We aimed to determine if such an association may exist through a systematic review and meta-analysis.

Methods: Inclusion criteria were: (i) observational or interventional studies of participants aged ≥18 years (ii) that assessed the relationship between OHT and (iii) at least one of all-cause mortality, cardiovascular disease (CVD), heart failure, stroke/cerebrovascular disease, falls or conditions of neurocognitive decline. MEDLINE, EMBASE, Cochrane, clinicaltrials.gov and PubMed (inception–19th April 2022) were searched. Two independent reviewers conducted screening, data extraction and critical appraisals using the Newcastle-Ottawa Scale1. Random-effects meta-analysis was performed of unadjusted and/or adjusted estimates in RevMan software2 and a narrative synthesis presented, where applicable.

Results: Nineteen studies (52340 participants; 50.6% women) were eligible, of which twelve were meta-analysable. Median (IQR)

follow-up time for prospective studies was 7.90 (4.40, 11.65) years. Eleven studies were of high quality and eight of moderate. Relative to orthostatic normotension (ONT), systolic OHT (SOHT) was associated with a significant 22% greater risk of all-cause mortality (HR: 1.22, 1.04–1.43), a near doubling in the odds of incident stroke/cerebrovascular disease (OR: 1.94, 1.52–2.48) and a non-significant 37% greater risk of incident heart failure (HR:1.37, 0.74–2.55). Narrative synthesis of three among seven studies on CVD/CVD-related mortality highlighted increased risk associated with SOHT. Three out of four studies on cognitive function found significantly poorer neurobehavioral function, cognitive decline or severe cognitive impairment in relation to SOHT, whereas one study found no association between SOHT and cognitive domain.

Conclusions: Patients with SOHT display a significantly higher mortality risk relative to those with ONT, as well as almost double the odds of stroke/cerebrovascular disease. Whether interventions can reduce OHT and improve outcomes is unknown.

Disclosures: None.

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P–40 Nailfold video-capillaroscopy in the study of cardiovascular disease: a systematic review

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Introduction: Resistance arteries regulate blood flow to the organs and tissues. Small resistance arteries, along with arterioles, capillaries and venules form the microcirculation. One method of assessing the microvasculature is nailfold video-capillaroscopy (NVC). We aimed to review the available literature to assess whether structural and functional changes to the nailfold capillaries exist in patients with cardiovascular disease (CVD).

Methods: We searched PubMed, Scopus, and Cochrane Library databases for original research articles relating to the use of non-invasive microvascular assessment in patients with CVD. Methodological quality was assessed via the 'Quality Assessment Tool for Observational Cohort and Cross-sectional Studies'. The results obtained from NVC were analysed qualitatively and compared to other forms of microvascular assessment.

Results: 2759 articles were screened, of which 22 studies involving a total of 562 patients (~40% women) with CVD were included. Mean age ranged between 3.7 to 68.4 (cases) and 4.0 to 58.0 years (controls). Reduced capillary density and increased capillary dimensions were seen in patients with pre-capillary pulmonary hypertension. Among patients with systemic sclerosis, advanced scleroderma patterns can be used to identify patients with or at risk of developing pulmonary arterial hypertension. Functional changes to the nailfold precede structural changes in patients with hypertension. However, the studies were heterogeneous in the diagnosis of CVD and the measurement of nailfold parameters. Most studies did not exclude conditions with altered nailfold features. Only one study performed a power calculation. Furthermore, abnormal nailfold findings may be present in patients without systemic disease.

Conclusions: Structural and functional changes to the nailfold are a feature of established CVD and precede the development of pulmonary hypertension in patients with systemic sclerosis. However, the heterogeneity in measurement and abnormal findings in patients without systemic disease limit the use of NVC in the wider population.

Disclosures: None

References: None

P–41 Aetiology of Resistant Hypertension: A Systematic Review

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Introduction: Resistant hypertension (RH) is the failure to achieve blood pressure (bp) control with the concurrent use of three antihypertensive medications including a diuretic or when bp control is achieved with ≥4 antihypertensives. Many factors contribute to uncontrolled bp; however, the exact cause is unknown.

Methods: An electronic search was conducted on January 2021, to identify studies conducted to evaluate the underlying cause for RH, using the PICO framework (Population: RH, Intervention: None, Comparator: No RH, Outcome: biochemical, clinical, demographic differences). All secondary forms of hypertension, studies that looked at treatment, prevalence, review papers and non-English papers were excluded.

Results: 21 studies from 10,721 articles, were included, with a total of 5,491 RH patients (range, 25–3,060; mean age range: 27.2–66.8 years; males (n = 2,214). BMI ranged from 26–77 kg/m^2, 3 to 10% smokers, 11 to 65% had diabetes. The average office systolic bp ranged from 137.7 ± 10.8 to182.6 ± 27.9 mm Hg and the diastolic bp from 77.1 ± 0.3 to 101.8 ± 19.5; average 24-hr systolic ABPM ranged from127.6 ± 9.6 to 151.6 ± 8.7 mm Hg and the 24- hr diastolic from 77.0 ± 12.0 to 90.2 ± 4.6. Out of the ten studies, eight showed significant ($p < 0.05$) increase in plasma aldosterone concentration. Plasma aldosterone levels was found positively correlated with age, BMI, systolic blood pressure and pulse wave velocity. As there was significant heterogeneity across studies with scattered data, meta-analysis could not be performed.

Conclusions: The results of this systematic review suggest some evidence on the role of increasing age, black ethnicity, obesity, smoking, diabetes, raised aldosterone levels, inflammatory markers, and arterial stiffness and the risk of RH. The main limitation was the lack of confirmation of RH through a 24-hr ABPM or urine adherence testing. All studies recommend for further investigation in larger RH population due to the small sample size and the cross-sectional design.

Disclosures: There are no conflicts of interest.

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management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH)' *European Heart Journal*, 39 (13), p. 3003–3148.

P–42 Systolic blood pressure and renal function impact on clinical outcomes in patients with atrial fibrillation: Results from the AF-GEN-UK registry

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Introduction: Extremes of blood pressure (BP) and renal dysfunction contribute to poor outcomes in patients with atrial fibrillation (AF). Hypertension is also a risk factor for renal disease leading to the possible interaction for prognostication in AF. We investigated the possible interaction using data from the AF-GEN-UK study, the UK extension of the prospective EURObservational Research Programme (EORP) Long-term General Registry of patients with AF.

Methods: Baseline systolic BP (SBP, mmHg) was recorded for 1580 patients (age 71 (11), 40% female) and categorised as 120–129 (n = 289) the reference group, <100 (n = 165), 110–119, (n = 254), 130–139 (n = 321), 140–159 (n = 385), and ≥160 (n = 166). Cox regression adjusted for age, oral anticoagulation (OAC) and CHA_2DS_2-VASc score examined the impact of SBP, renal function and their interaction on death thromboembolism, and major bleeding at 1-year (STATA Corp, version 13).

Results: The SBP groups had similar OAC use (average 84%) and preserved renal function (median [IQR] eGFR 81 [61–107] with lower values in 110–119 group. People with SBP > 140 were older, included more women, and had higher CHA_2DS_2VASc scores. SBP < 100 was predictive of death in univariate (Hazard Ratio [HR] 2.36, 95% confidence interval [CI] 1.20–4.64) and adjusted (aHR 9.71, 95% CI 1.73–54.5) analyses. Lower eGFR was predictive of death in univariate (HR 0.99, 95% CI 0.98–0.996) but not multivariate analyses (aHR 1.00, 95% CI 0.98–1.01). There was no interaction between SBP and eGFR, nor an association of SBP with haemorrhagic or thromboembolic events.

Conclusions: SBP < 110 is independently predictive of mortality in AF with no interaction with renal function. Reasons for this association requires further exploration.

Disclosures: AS, none. GYHL, Consultant and speaker for BMS/Pfizer, Boehringer Ingelheim and Daiichi-Sankyo. No fees are received personally. DAL, has received investigator-initiated educational grants from Bristol-Myers Squibb (BMS), speaker for Bayer, Boehringer Ingelheim, and BMS/Pfizer; consultant for BMS, and Boehringer Ingelheim.

References: None

P–43 Cost-Effectiveness of Radiofrequency Renal Denervation in a UK Setting based on Data from the SPYRAL HTN-ON MED Study

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Introduction: Catheter-based radiofrequency renal denervation (RDN) is a promising interventional treatment for uncontrolled hypertension. We evaluated the lifetime cost-effectiveness of RDN in the UK NHS healthcare system using data from the SPYRAL HTN-ON MED randomized, sham-controlled pilot trial [1].

Methods: A decision-analytic model based on multivariate risk equations was used to project quality-adjusted life years (QALYs) and costs over the patients' lifetime. The model consisted of six health states: hypertension alone, myocardial infarction, other symptomatic coronary artery disease, stroke, heart failure, and end-stage renal disease. Risk reduction associated with changes in office systolic blood pressure (oSBP) in the treatment group was estimated based on a published meta-regression of 68 hypertension RCTs [2]. The base case effect size of −6.8 mmHg oSBP (observed vs. sham control) was taken from the SPYRAL HTN-ON MED pilot trial results reported at 6-months [1]. An alternative scenario considered an imputed effect size of −8.2 mmHg based on 3-year follow up from the same cohort [3]. A threshold analysis was also conducted. Costs were based on 2020 NHS England costs, and a 3.5% discount rate was applied to both costs and health effects. The incremental cost-effectiveness ratio (ICER) was evaluated against the NICE willingness-to-pay threshold of £20–30,000 per QALY gained.

Results: RDN resulted in an increase in health benefit over a patient's lifetime, adding 0.48 QALYs (0.52 based on 3-year data) at a concurrent cost increase of £3,428 (£3,170), resulting in an ICER of £7,169 (£6,102) per QALY gained. In the threshold analyses, RDN was cost-effective at effect sizes down to −4 mmHg.

Conclusions: According to model-based projections of the SPYRAL HTN-ON MED trial, catheter-based radiofrequency RDN can be expected to be cost-effective in the UK healthcare system, with an ICER substantially below the NICE willingness-to-pay thresholds.

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P–44 Effect of blood pressure on exercise tolerance in atrial fibrillation: insight from the IMPRESS-AF trial

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Introduction: Exercise intolerance is common in atrial fibrillation (AF), even when the left ventricular ejection fraction (LVEF) is preserved. This is contributed by diastolic dysfunction due to loss of atrial systole and cardiac fibrosis. In the double-blind, randomised placebo-controlled IMPRESS-AF trial, 2-year treatment with spironolactone vs placebo failed to improve the primary outcome of peak oxygen consumption (peakVO2) on cardiopulmonary exercise testing in patients with LVEF ≥ 55%. This study analysed the impact of blood pressure (BP) on the trial results.

Methods: The study analysed office BP (mmHg) in IMPRESS-AF trial patients (n = 250, mean age 72 ± 7 years, 24% female); 207 completed 2-year follow-up (Python 9.3 libraries).

Results: Two-year spironolactone systolic BP (SBP) reduction was median 20 [IQR 10–36] in patients with baseline SBP ≥ 140 (n = 27) vs 4.5[4–12] in those with normal SBP (n = 74, p = 0.002). Spironolactone diastolic BP (DBP) reduction was 18 [12–23] in patients with DBP ≥ 90 (n = 14) vs. 2 [−5–11] for normal baseline DBP (n = 87, p = 0.03). BP did not significantly change in the placebo group (p > 0.05). On multivariable linear regression, higher systolic BP was independently predictive of higher baseline peakVO2 (coefficient 0.04, 95% CI 0.01–0.07, p = 0.017). Other independent predictors were higher age and haemoglobin, lower e/e' (ratio of early mitral inflow velocity and mitral annular early diastolic velocity), BMI, and male sex (p < 0.05). Baseline BP and follow up BP changes were not predictive of 2-year peakVO2 before and after adjustment for spironolactone treatment (p > 0.05).

Conclusions: Pharmacological BP reduction by spironolactone do not influence exercise tolerance in AF. Higher systolic BP may support achieving higher peakVO2, potentially compensating for AF-related diastolic dysfunction. This suggests different immediate and long-term implications of higher BP in AF to be considered when developing future treatment.

Disclosures: ES, AS none. GYHL, Consultant and speaker for BMS/Pfizer, Boehringer Ingelheim and Daiichi-Sankyo. No fees are received personally.

References: ClinicalTrials.gov Identifier: NCT02673463.
EudraCT Number: 2014-003702-33

P–45 Blood pressure reduction after catheter-based radiofrequency renal denervation in the Global SYMPLICITY Registry

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Introduction: Results from randomized sham-controlled clinical trials have demonstrated the safety and efficacy of catheter-based radiofrequency renal denervation (RDN) to lower blood pressure (BP) in hypertensive patients with and without antihypertensive medications [1–4].

Methods: The Global SYMPLICITY Registry (GSR) is a prospective registry to assess the safety and efficacy of radiofrequency RDN. Office and ambulatory systolic BP measurements were collected at baseline, 3, 6, 12, 24, and 36 months per standard of care. Adverse events were collected out to 36 months. "In this analysis, we present safety and efficacy data for patients who received RDN with the multi-electrode Symplicity Spyral catheter in GSR" [5].

Results: As of March 2021, 641 patients were treated with the Symplicity Spyral catheter in GSR (baseline office systolic BP (SBP) "168 ± 25 mmHg, 4.6 ± 1.5 prescribed anti-hypertensive medication classes, mean age 60.5 ± 12.5 years, 56.9% male, 42.5% history of cardiac disease, 37.2% type II diabetes mellitus, and 19.1% renal insufficiency with eGFR<60 ml/min/1.73 m2)" [5]. Mean change in eGFR from baseline to 36 months was −6.5 ± 15.7 mL/min/1.73 m2. Of patients with 36-month follow-up, change in mean 24-hour SBP was −17.1 mmHg (N = 55) and mean office SBP change was −18.6 mmHg (n = 167). At 36 months, there were no cases of new renal artery stenosis >70% or renal artery re-intervention. Rates of other adverse events at 36 months included new onset end stage renal disease (2.4%), cardiovascular death (1.6%) and myocardial infarction (0.8%) [5].

Conclusions: Office and 24-hour SBP were significantly reduced from baseline after catheter-based radiofrequency RDN with the Symplicity Spyral catheter, with no instances of renal artery re-intervention [5].

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P–46 Visualisation to Support Treatment Adherence in High Blood Pressure (ViSTA-BP): a feasibility study for a community pharmacy-based intervention

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Introduction: Antihypertensive medication adherence can be challenging; around half of patients are non-adherent within a

year of treatment initiation[1]. Intentional non-adherence is a conscious or sub-conscious decision not to adhere, often driven by illness or treatment beliefs[2]. Interventions to improve medication adherence are required.

ViSTA-BP utilises a web-based application, introducing an interactive communication platform via animated visual representation of hypertension physiology and circulatory system anatomy, within a guided consultation. A pre-post design pilot study investigated the feasibility and acceptability of ViSTA-BP in community pharmacies (CP), evaluating effects on patients' perceptions of hypertension, medication adherence and blood pressure (BP).

Methods: Sixty-nine patients prescribed antihypertensive medication were recruited by pharmacists across five CP sites. ViSTA-BP was consultation-based and researcher facilitated. Illness and treatment beliefs (Brief Illness Perception Questionnaire (B-IPQ)/ Beliefs about Medicines Questionnaire (BMQ)), adherence (Medicines Adherence Rating Scale (MARS-5)/recent adherence questionnaire, medication dispensing/collection data) and BP were recorded at baseline, immediately post-intervention and three-months later. Qualitative interviews explored acceptability.

Results: ViSTA-BP feasibility within CP was demonstrated through ease of participant recruitment and high retention rates. ViSTA-BP was considered acceptable by patients and pharmacists. Effectiveness was demonstrated by statistically significant improvements at 3 months in B-IPQ treatment control ($p = 0.011$), illness coherence ($p < .001$) and BMQ Necessity-subscale scores ($p = 0.003$). Adherence outcomes did not change, however, systolic BP improved significantly between baseline and three-months (baseline Md = 148 mmHg(IQR135-160 mmHg);three-months Md = 133 mmHg(IQR126-148 mmHg), $z = -3.19$, $n = 51$,$p < 0.01$).

Conclusions: ViSTA-BP was feasible and acceptable, showing positive effects on patients' perceptions and clinical outcomes that warrant further investigation in an adequately powered controlled trial.

Disclosures: None

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P–47 Systolic blood pressure variability is a major risk factor for renal outcomes in hypertensive patients: Evidence from the 20-year follow-up of the Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT)

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Introduction: Observational studies have shown that high blood pressure (BP) is associated with an increased risk of adverse renal outcomes. Therefore, lowering blood pressure should reduce the risk of such consequences. However, the relation between renal outcomes with visit-to visit blood pressure variability (BPV) remains controversial.

Methods: In the ASCOT-Legacy Study, 7,092 hypertensive patients (assigned to either amlodipine- or atenolol-based treatment) from the UK were followed for up to 20 years to report the long-term determinants of renal outcomes. All available BP visit records ($n = 100{,}933$) were included after excluding the first six months observations. The mean of systolic (SBP) as a measure of BP control and the standard deviation (SD) of all SBPs as an estimate of visit-to-visit BPV were calculated for the five years of the trial. Participants were then followed for up to 15 years after the end of the trial using NHS electronic health records. Total renal outcomes (renal failure, chronic kidney disease, dialysis and transplantation) were measured using Cox proportional hazards model adjusted for confounding variables.

Results: About one-third ($n = 2{,}354$) of participants experienced at least one of the renal outcomes during the follow-up. Our findings showed that an increase per one SD (10.39 mmHg) in mean SBP was associated with a hazard ratio (HR) of 1.23 (95% CI 1.17−1.20; $p < 0.001$) and an increase per one SD (4.72 mmHg) in BPV was associated with an HR of 1.20 (95% CI 1.14−1.26; $p < 0.001$) higher risk of total renal outcomes. For those participants in the highest tertiles of both mean SBP and BPV, the risk of renal outcomes was twofold higher when compared with the lowest tertiles.

Conclusions: Both mean SBP and BPV are strong predictors of long-term renal outcomes, but BPV, independent of mean BP, confers a significant additional risk and should be considered for future preventive and therapeutic strategies.

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References: None

P–48 A novel blood test measuring the erythrocyte sensitivity to sodium may help to identify individuals with essential hypertension and a low renin pro-inflammatory state

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Introduction: The link between dietary salt intake and hypertension is well documented [1]. Apart from contributing to water retention and volume expansion [2], dietary salt alters immune cell function thus contributing to hypertension through pro-inflammatory mechanisms [3]. The erythrocyte glycocalyx sensitivity to sodium (eGCSS) is a novel test of salt sensitivity in humans proposed as a marker of sodium-induced damage at a cellular level. Here we examined whether eGCSS relates to plasma renin (as surrogate marker of salt-induced volume expansion), erythrocyte sedimentation rate (ESR) and C reactive protein (CRP) - both markers of inflammation-in essential hypertension.

Methods: Subjects with essential hypertension had biochemistry investigations including eGCSS, renin ESR and CRP alongside with anthropometric and hemodynamic measurements. Correlations between eGCSS and renin, ESR and CRP were explored using Pearson correlation coefficient. The population was also divided in tertiles according to eGCSS and analysed by one-way analysis of variance (ANOVA).

Results: 106 subjects (age (mean ± standard error) 45.4 ± 1.23 years, 55% male, 50% Caucasian were recruited. Despite no difference in blood pressure (BP), age, body composition, prevalence of diabetes, cardiovascular events or dyslipidaemia, subjects in the highest eGCSS tertile (167.4 ± 3.77%) had lower plasma renin, higher ESR and CRP compared to lowest tertile of eGCSS (107.93 ± 40.62 mU/L vs 23.26 ± 4.78 mU/L, $P = 0.006$; 18.48 ± 3.57 vs 5 ± 1.14, $P < 0.001$; and 6.86 + 30.4 vs 1.98 + 1.05, $P = 0.023$ respectively). In the whole

population eGCSS was also inversely correlated to renin ($\beta = -0.258$, $P = 0.014$) and positively correlated with ESR ($\beta = 0.449$, $P < 0.001$) and CRP ($\beta = 0.296$, $P = 0.039$).

Conclusions: eGCSS could be a useful test to identify subjects with a low-renin pro-inflammatory state which could be one of the mechanisms through which a high salt microenvironment contributes to the pathogenesis of hypertension.

Disclosures: None

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