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DIABETIC Medicine

Poster abstracts

Basic and clinical science posters: Actions, metabolism and therapy

P1 | The effect of canagliflozin 300 mg on glucose homeostasis in people without diabetes after bariatric surgery (the control study): A proof-of-concept, randomised, open label, two period crossover study

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Background: Post-bariatric hypoglycaemia (PBH) is a common complication after bariatric surgery (BS), which is characterised by high peak glucose levels and increased early insulin secretion. Canagliflozin 300 mg (CANA300), a sodium-glucose co-transporter-2 inhibitor (SGLT-2i) with transient SGLT-1i effect, reduces the peak postprandial glucose and insulin secretion in people without diabetes, however whether this is evident after BS has not been assessed.

Aim: The aim of the study was to investigate the effect of CANA300 on glucose homeostasis in people without diabetes after BS.

Methods: Nineteen adults after BS (12 gastric bypass and 7 sleeve gastrectomy) without a diagnosis of PBH were randomised to CANA300 once daily or standard care (SC) over five days in an open-label, crossover trial. Primary outcome was the nadir glucose during a mixed meal tolerance test (MMTT), performed at the fifth day of each treatment period. Secondary outcomes during the MMTT included the amplitude of glucose excursion (peak to nadir), peak glucose levels and early insulin secretion [area under the curve (AUC)(0–30)].

Results: Nadir glucose was higher with CANA300 vs SC (3.75 vs 3.41 mmol/L, estimated treatment difference (ETD) 0.35 mmol/L, 95% CI 0.05–0.65, $p=0.03$). CANA300 reduced peak glucose levels compared to SC during the MMTT (ETD −1.07 mmol/L, $p<0.01$), the amplitude of glucose excursion (ETD −1.27 mmol/L, $p<0.01$) and the insulin AUC(0–30) (−20%, $p=0.02$).

Conclusion: CANA300 results in higher nadir glucose levels and reduces the amplitude of glucose excursion, peak glucose levels and early insulin secretion in people without diabetes after BS suggesting that it may be a potential treatment for PBH.

P2 | A mycoprotein-rich vegan diet improves glycaemic control to a similar extent as an animal-protein diet in people with type 2 diabetes

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Aims: Mycoprotein, a high-fibre high-protein food ingredient, that has been previously shown to improve acute glycaemic control in young healthy adults, but has not been investigated in people with type 2 diabetes. The impact of habitual mycoprotein consumption on glycaemic control has not been explored. The present study aimed to determine whether a mycoprotein rich vegan diet would improve glycaemic control to a similar extent as an animal-based protein diet in people with type 2 diabetes.

Methods: Seventeen adults with type 2 diabetes were randomised to a five weeks controlled high-protein diet incorporating either mycoprotein-based ($n=8$, $F=1$) (age 58 ± 7 year, BMI 32 ± 4 kg m^{-2}), or animal-based ($n=9$,

$F=4$) (age 59 ± 9 years, BMI 33 ± 6 kg m^{-2}) sources of protein. Both diets were eucaloric with 30%, 35% and 35% of energy from protein, fat and carbohydrate. Glycaemic control was measured using HbA1c and 'time in range' using continuous glucose monitoring and assessed using two-way ANOVA.

Results: Both diets resulted in a significantly greater time in range post-intervention ($p=0.0395$) (mean increase in time in range of 12% and 23% in the animal and mycoprotein groups respectively). HbA1c decreased from 58 ± 14 to 53 ± 15 mmol mol^{-1} in the animal group and from 62 ± 16 to 53 ± 14 mmol mol^{-1} in the mycoprotein group ($p=0.0008$). There was no greater improvement in glycaemic control observed with the mycoprotein group.

Conclusions: A mycoprotein rich diet improved glycaemic control comparable to the improvements observed with an animal protein diet. Mycoprotein can be incorporated into a vegan diet to support improvements in glycaemic control in people with type 2 diabetes.

Acknowledgement: Nutritional Physiology Research Group.

P3 | A mycoprotein-rich vegan diet lowers serum cholesterol concentrations to a greater extent than an animal-protein diet in people with type 2 diabetes

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Aims: Mycoprotein, a high-fibre food ingredient, has been previously shown to lower serum cholesterol concentrations in hypercholesterolemic adults but has not been investigated in people with type 2 diabetes. The present study aimed to determine whether a mycoprotein-rich vegan diet would lower serum cholesterol concentrations compared to an animal-based protein diet in people with type 2 diabetes.

Methods: Seventeen adults with type 2 diabetes were randomised to a five weeks diet incorporating either mycoprotein-based ($n=8$, $F=1$) (age 58 ± 7 years, BMI 32 ± 4 kg m^{-2}), or animal-based ($n=9$, $F=4$) (age 59 ± 9 years, BMI 33 ± 6 kg m^{-2}) sources of protein. Both diets were eucaloric with 30%, 35% and 35% of energy from protein, fat and carbohydrate. Fasting total-, HDL- and LDL-cholesterol and triglycerides were measured before, after 2 weeks, and after 5 weeks of controlled diet and assessed using two-way ANOVA.

Results: Total cholesterol at two weeks was $+0.1\pm0.2$ and -0.7 ± 0.2 mmol L^{-1} in the animal and mycoprotein groups, respectively, and -0.4 ± 0.2 and -1.0 ± 0.2 mmol L^{-1} at 5 weeks compared to baseline (time × diet $p=0.02$). LDL-cholesterol decreased by 0.2 ± 0.2 and 0.6 ± 0.2 mmol L^{-1} in the animal and mycoprotein groups after 5 weeks (time × diet $p=0.04$). Both diets reduced serum triglycerides and HDL-cholesterol after 5 weeks, but there was no difference in the reduction between groups (time × diet $p=0.32$).

Conclusions: A mycoprotein-rich vegan diet lowered cholesterol concentrations to a greater extent than an animal protein diet. Mycoprotein can be incorporated into a vegan diet to support improvements in markers of cardiometabolic health in people with type 2 diabetes.

Acknowledgement: Nutritional Physiology Research Group.

P4 DUK | The effect of canagliflozin 300 mg on glycaemic control and variability changes over the day in people without diabetes after bariatric surgery: Continuous glucose monitoring data from an open label, randomised, crossover trial

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Background: Canagliflozin 300 mg (CANA300) is sodium-glucose co-transporter-2 inhibitor (SGLT-2i) with transient SGLT-1i effect. It reduces glucose excursion after bariatric surgery (BS) in a mixed meal test performed 30 min after CANA300 consumption, suggesting that it could be a potential treatment for post-bariatric hypoglycaemia (PBH). However, the transient effect of CANA300 on SGLT-1 may affect glucose variability throughout the day.

Aim: The aim of the study was to investigate whether CANA300 effect on glucose control and variability changes throughout the day for people without diabetes post-BS.
Methods: Fourteen adults post-BS, without PBH symptoms, were randomised to CANA300 once daily or standard care over 5 days in a crossover trial. Participants were advised to take CANA300 in the morning, before breakfast. Continuous glucose monitoring data was collected through a blinded Dexcom G6 device for five days during both treatment periods. The difference in area under the curve (AUC) and coefficient of variation (CV) for glucose during three time intervals [6 am to 12 pm (morning), 12 pm to 6 pm (afternoon), 6 pm to 12 am (evening)] was assessed using general estimating equations.
Results: CANA300 effect on glucose AUC and CV decreases during the day (morning vs afternoon, $p < 0.001$ and morning vs evening $p < 0.001$, for both parameters), after adjustment for treatment, energy intake and macronutrient intake during each time interval.
Conclusion: The effect of CANA300 on glycaemic control and variability decreases during the day in people without diabetes after BS. Further investigation may be required on pharmacodynamics, timing and frequency of medication intake, if CANA300 is to be used as PBH treatment.

Basic and clinical science posters: Adipocyte function

P5 | The interferome nexus: A negative regulator of adipogenesis yet positive regulator of local and systemic insulin sensitivity

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Background: Coordinated adipogenesis helps maintain adipose tissue function and reduce obesity-associated complications including type 2 diabetes. We previously demonstrated that fibroblast growth factor-1 (FGF-1) promotes adipogenesis via a novel BMP and activin membrane bound inhibitor *(BAMBI)*/peroxisome proliferator activated receptor gamma *(PPARg)*-dependent pathway.
Aims: Use targeted approaches to identify novel downstream regulators of adipogenesis implicated in the modulation insulin sensitivity.
Methods: A combination of RNA-Seq, functional investigations and association studies using *in vitro* cell systems and human adipose tissue.
Results: Treatment with FGF-1 significantly altered the expression of 598 genes, including 49 'interferome' genes, of which 11 were downstream of *BAMBI* and *PPARg*. In silico analysis revealed a nexus that included all 11 FGF-1/*BAMBI/PPARg*-dependent genes. Functional characterisation of five nexus genes revealed all were negative regulators of adipogenesis. Determination of the expression profile of these genes in subcutaneous human adipose tissue from obese males with varying degrees of insulin sensitivity revealed gene expression correlated with local (adipose) and systemic (skeletal muscle) insulin sensitivity. This contrasted with a classic inflammatory gene signature which showed the expected inverse correlation with insulin sensitivity.
Conclusions: Collectively these findings increase our understanding of the molecular networks that regulate adipogenesis and, somewhat paradoxically, reveal the interferome nexus as a potential positive regulator of both local and systemic insulin sensitivity. Additional studies are required to define molecular mechanisms and therapeutic opportunities.

Basic and clinical science posters: Basic science of diabetes complications

P6 | Prevalence, incidence and proteomic signatures associated with lung disease in people with type 2 diabetes from the UK Biobank

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Refer to Oral number A59.

P7 DUK BS | The connexin-43 (Cx43) channel modifier Danegaptide prevents changes associated with cell senescence in an *in vitro* model of diabetic nephropathy

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Aims: Aberrant Cx43 hemichannel activity initiates senescence in several diseases. This study evaluated the effect of Cx43 channel modifier Danegaptide on hydrogen peroxide (H2O2)-induced cell senescence in an *in vitro* model of diabetic kidney disease (DKD).

Methods: Unpublished NephroSeq transcriptomic data sets from biopsies of DKD were analysed for p16 and p21 expression/correlation. Human kidney (HK2) proximal tubule epithelial cells were treated in basal (5 mM) or high (25 mM) glucose ± H_2O_2 (200 μM) ± Danegaptide (100 nM). Indicative of senescence, changes in cell area were quantified using ImageJ. Adenosine triphosphate (ATP) lite luminescence determined extracellular ATP release. qRT-PCR assessed gene expression.
Results: In DKD, increased expression of senescent cell markers p16 (*CDKN1A*) and p21 (*CDKN2A*) correlate with declining glomerular filtration rate (GFR; $p < 0.05$ and $p < 0.01$ respectively). Danegaptide reduced H2O2-induced increases in HK2 cell size by 69.5 ± 11.7% ($p < 0.01$) at 5 mM glucose, and by 53.4 ± 5.6% ($p < 0.05$) at 25 mM glucose. High glucose increased ATP release to 131.7 ± 5.7% as compared to basal control ($p < 0.01$), an effect reduced by Danegaptide (33.4 ± 1.2%; $p < 0.001$). Similarly, high glucose + H2O2 triggered an increase in extracellular ATP release of 17.8 ± 3.4% ($p < 0.05$), an effect reduced with Danegaptide ($p < 0.001$). Under high glucose conditions in HK2 cells, p16 and p21 gene expression increased following 2 hr treatment with H2O2 by 326.9 ± 18.2%, $p < 0.001$ and 208.2 ± 65.7%, $p < 0.05$, respectively, as compared to basal control. Increases in p16 were reduced with Danegaptide by 182.8 ± 57.8% ($p < 0.05$).
Conclusion: Danegaptide blocks glucose and H2O2-induced increases in markers of cell senescence in tubular epithelial cells and suggests a role for Cx43 hemichannel-mediated ATP release.

P8 | Tonabersat blocks connexin-43 (Cx43) hemichannels to protect against macrophage migration and polarisation in an *in vitro* model of diabetic nephropathy

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Refer to Oral number A36.

P9 | The sodium/glucose cotransporter-2 inhibitor (SGLT2i) empagliflozin, reduces nod-like receptor protein 3 (NLRP3) activity in an *in vitro* model of chronic kidney disease

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Refer to Oral number A46.

P10 | Phytochemistry and insulin-releasing effects of aqueous and methanolic extracts of *Anona muricata* leaves

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Aim: *Anona muricata* fruits is consumed as food in many parts of the globe. For extracts of different parts of the plant, report indicate pharmacological effects, glucose metabolism and traditional use in the management of diabetes. However, mechanisms underlying the majority of these beneficial effects are poorly understood.
Methods: Aqueous and methanolic extracts of *A. muricata* leaves were prepared and extracts screened for the presence of key phytochemicals. Total phenolic and flavonoids content of extracts were also assessed. Clonal pancreatic cells were incubated with serial dilutions of extracts and concentrations of insulin and lactate dehydrogenase (for cytotoxicity) were measured in cell supernatant. Effects of extracts on cell viability was assessed. Effects of aqueous extracts of *A. muricata* on intracellular calcium and membrane potential were assessed.
Result: Data obtained revealed the preponderance of tannin, phlobatannin, alkaloids, cardiac glycosides, terpenoids, steroid, anthraquinone and saponins. *A. muricata* extracts significantly stimulated insulin secretion from BRIN-BD11 cells. The lowest stimulatory concentration observed for aqueous (5.3-fold, $p < 0.001$) and methanolic (6.7-fold, $p < 0.001$) extracts of *A. muricata* was 100 μg/mL. Effects at extract concentration of 1000 μg/mL were observed to be toxic to cells. These extracts also significantly reduced cell viability at 1000 μg/mL. Aqueous extracts of *A. muricata* significantly enhanced membrane potential (26%, $p < 0.01$) and increased intracellular calcium (37%, $p < 0.01$).
Conclusion: These preliminary data partly confirm the stimulation of insulin secretion as part of the antidiabetic actions of the plant extract and suggests that further investigations are needed to investigate other antidiabetic promise of the plant, particularly at safe concentrations.

Basic and clinical science posters: Beta cells, islets and stem cells

P11 DUK | Uncovering the role of RNA binding proteins in the ER stress response in pancreatic beta cells

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Aim: Chronic ER stress is implicated in the development of beta cell dysfunction and death in diabetes. As RNA-binding proteins (RBPs) likely play an essential role in ER stress-induced changes in gene expression, the aims of this research were to identify global changes in the binding of RBPs to RNA in response to ER stress in beta cells, and then to determine the role of ER-stress-regulated RBPs in beta cell function.
Methods: The mouse beta cell line, MIN6, were incubated in the presence or absence of thapsigargin, a pharmacological inducer of ER stress, and RNA bound RBPs identified using RNA interactome capture (RiC) and quantitative mass spectroscopy (SWATH-MS). Knock-down cells of selected stress-regulated RBPs were generated by shRNA. Changes in gene expression were determined by qPCR and Western blot analysis, whereas viability was assessed using Alamar blue.
Results: Three hundred twenty-four RBPs were identified of which 49 were modulated by ER stress (i.e. $p > 0.05$ and 1.5× fold change) including the RNA helicase, *Ddx3x*, whose binding to mRNA was promoted by ER stress. Bioinformatic analysis of published CLIP data for *Ddx3x* revealed common *Ddx3x* target mRNAs associated with ER stress and the unfolded protein response (UPR). knock-down of *Ddx3x* in MIN6 cells reduced the expression of defined target mRNAs in response to ER stress, including *ATF4* and *CHoP*, and delayed ER stress-induced cell death.
Conclusion: Our results provide evidence that ER stress-regulated RBPs play an important role in the execution of the UPR and thus beta cell fate.
Support Information: This work is supported by a Diabetes UK studentship.

P12 BS | Multi-transcriptomics integration reveals delta cell localisation of ghrelin receptor (GHSR) mRNA expression in mouse and human islets: Implications for the effects of ghrelin on islet function

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Aims: We quantified cellular localisation of mRNA encoding the ghrelin receptor *GHSR* in human and mouse islets from obese and lean individuals via multi-transcriptomics integration and we investigated the effects of ghrelin on islet function.
Methods: RT-qPCR was used to quantify *GHSR* mRNA expression in human islets isolated from lean and obese donors ($n = 8$ obese, $n = 7$ lean; BMI: $p < 0.05$) and mouse islets isolated from a 16 week high-fat diet (HFD) and chow diet (CD) C57 mice ($n = 3$ for HFD and CD; body weight: $p < 0.05$). Python-based Scanpy was used to analyse single-cell RNAseq data sets of human (GSE217837) and mouse (GSE203151) islets. Static incubations and caspase3/7 assays were used to quantify the effects of ghrelin on insulin secretion and apoptosis.
Results: *GHSR* mRNA was significantly upregulated in human islets from obese subjects (1.9 ± 0.4-fold, $p < 0.05$), but *Ghsr* mRNA expression was not significantly different between HFD and CD mouse islets (0.9 ± 0.1-fold, $p = 0.7$). Analysis of single-cell RNAseq data showed that *GHSR* was co-localised with *SST* in both human and mouse islets, indicating its expression by delta cells. Ghrelin significantly decreased glucose-dependent insulin secretion from mouse islets (20 mM glucose: 0.55 ± 0.21 ng/islet/h; +100 nM ghrelin: 0.22 ± 0.17; $p < 0.05$; $n = 3$), but it was without effect on cytokine-induced apoptosis (cytokines: $181 \pm 25.4\%$ basal; +100 nM ghrelin: 157 ± 28.7; $p > 0.05$; $n = 4$).
Conclusions: We have identified that *GHSR*, a Gq-coupled receptor, is mainly expressed by delta cells in both human and mouse islets, and its inhibitory effects on glucose-induced insulin secretion are likely to be indirect via increasing somatostatin secretion to activate beta cell somatostatin receptors.

P13 DUK BS | Mitochondrial fission process 1 (*MTFP1*) regulates glucose stimulated insulin secretion in pancreatic beta cells

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Aims: Mitochondrial function is essential for integrating glucose metabolism and insulin secretion in pancreatic beta cells. Mitochondrial dysfunction disrupts beta cell function and may contribute to type 2 diabetes progression. Mitochondrial fission process 1 (*MTFP1*) is an inner mitochondrial membrane protein that regulates mitochondrial fission and/or function in a cell-specific manner. In beta cells, *MTFP1* is directly repressed by miR-125b, which plays a negative role in insulin secretion through multiple aspects of beta cell biology, including mitochondrial function.

Here, we seek to study the role of beta cell *MTFP1* in glucose stimulated insulin secretion (GSIS) and its underlying mechanism of action.

Methods: We generated lentiviral vectors expressing Cas9 under the control of a rat insulin promoter and gRNAs targeting *MTFP1* and adenoviral vectors expressing human *MTFP1* to achieve *MTFP1* loss- and gain-of-function, respectively, in human EndoC-βH3 beta cells and in human islets. GSIS, mitochondrial morphology and/or DRP1 (dynamin-related protein 1) phosphorylation were assessed in these cells.

Results: Overexpression of *MTFP1* in both EndoC-βH3 cells and human islets resulted in significant increases in GSIS ($p = 0.0055$ and $p = 0.0529$ respectively). Conversely, CRISPR/Cas9-mediated elimination of *MTFP1* in EndoC-βH3 cells strongly decreased GSIS ($p = 0.0031$). Preliminary experiments suggest that these secretory effects occur in the absence of significant changes in mitochondrial morphology albeit, surprisingly, phosphorylation of the important fission regulator DRP1 was altered.

Conclusion: Our data reveal a critical role for *MTFP1* in insulin secretion. Ongoing work will provide important insights into the mechanism of action of this protein in beta cells and its role in glucose homeostasis *in vivo*.

P14 | JAKMIP1 is a novel regulator of interferon signalling in human beta cells

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Introduction: During type 1 diabetes pathogenesis pancreatic islets are exposed to a complex mixture of cytokines, including interferons (IFN). IFN released by influent immune cells (IFNγ) or in response to viral infection (IFNα) are known to contribute to beta cell destruction, in part through stimulating the upregulation of the Major Histocompatibility Complex Class I on their cell surface. JAKMIP1 is a protein which is known to interact with components of the JAK/STAT signalling cascade and was recently described to modulate IFN signalling. JAKMIP1 has not been studied in beta cells, and thus, in this work we will examine its impact on IFN signalling using human EndoC-βH1 cells as a model.

Methods: Gene and protein expression assessed by qPCR and Western blotting respectively. Luciferase reporter assays were used to measure IFN transcriptional activity. Expression vectors and siRNA were employed to modulate JAKMIP1 expression.

Results: Western blotting revealed JAKMIP1 is expressed in pancreatic islets and EndoC-βH1 cells. JAKMIP1 overexpression in EndoC-βH1 cells inhibited the transcriptional activity of IFNa (fold change from IFN stimulated cells: +IFN + JAKMIP1: 0.57 ± 0.04, $p < 0.01$), but not IFNγ. Alternatively, when targeted siRNA was used to deplete JAKMIP1 expression (fold change from control: 0.47 ± 0.2) IFNa transcriptional activity was potentiated (fold change from control: +IFN: 10.9 ± 0.6 + IFN + JAKMIP1: 14.9 ± 0.6 $p < 0.001$). In alignment with these findings the expression of various interferon stimulated genes was increased by JAKMIP1 knockdown (e.g. HLA-F: fold change from control: +IFN 38.8 ± 0.1 + IFN + JAKMIP1: 45.8 ± 2.1 $p < 0.05$).

Conclusion: Taken together, these data suggest that JAKMIP1 may be a novel negative regulator of IFN signalling in beta cells.

P15 | Activation of mesenchymal stromal cells (MSCs) co-cultured with islet beta cells and exposed to inflammatory cytokines

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Objectives: MSCs delay type 1 diabetes pathogenesis and improve islet transplantation outcomes. Little is known about how the inflammatory islet beta cell-MSC crosstalk influences therapeutic MSC gene expression in response to cytokines present during early (IFN-α alone) and later stage (IFN-γ and IL-1β (dual cytokines)) type 1 diabetes pathogenesis and after islet transplantation (IFN-γ, IL-1β and TNF-α (triple cytokines)). We have studied this.
Methods: Cytokine activation of mouse (M)- and human (H)-MSCs. Co-culture and cytokine exposure of primary mouse islets or EndoC-βH1 cells with M-MSCs or H-MSCs respectively. *CXCL9*, *NOS2 (M-MSC)/IDO-1(H-MSC)* and *PD-L1 mRNA* expression in MSCs quantified by RT-qPCR. Assessment of MSC and beta cell viability via flow cytometry.
Results: Trace expression of *CXCL9* and NOS2 was detected in IFN-α exposed M-MSCs (CT >30). Exposure of M-MSCs to dual or triple cytokines induced the expression of M-MSC activation and immunomodulatory markers, *CXCL9*, NOS2 and *PD-L1* (NOS2: >2000-fold and >40,000-fold, dual vs triple cytokines, $n=3$, $p<0.001$; *PD-L1:* >25-fold and >85-fold, dual vs triple cytokines, $n=3$, $p<0.05$). Similar trends were seen when gene expression profiles were compared among cytokine-exposed M-MSCs cultured alone or with islets. M-MSC viability was not affected after 1–3 days of IFN-α or dual cytokine exposure but was negatively affected after 1–3 days with triple cytokines (95.6%–41.1% respectively). Similar trends occurred in human MSCs.
Conclusions: Primary mouse islets do not reduce the expression of therapeutic markers associated with MSC immunomodulatory capacity. Mouse and human MSCs are activated by dual and triple cytokines, but not by IFN-α alone.

P16 | The identification of 'secretory' RNA-binding proteins (RBPs) provides evidence for a hitherto unknown link between gene expression and insulin exocytosis

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Aims: The aims of the study were to identify global changes in the binding of RBPs to RNA in response to glucose in pancreatic beta cells, and then to determine the role of selected glucose-regulated RBPs in beta cell function.
Methods: Experiments were performed using the mouse beta cell line, MIN6. Global identification of RBPs was determined using RNA interactome capture (RIC) and quantitative mass spectroscopy (SWATH-MS). Enhanced crosslinking immunoprecipitation (eCLIP) was used to identify RNAs bound to RBPs, and electrophoretic mobility shift assays (EMSA) and RNA immunoprecipitation (RIP) were used to confirm these findings.
Results: Three hundred ninety-eight RBPs were identified of which the binding of 59 to RNAs were significantly modulated by glucose. Ontological analysis revealed an enrichment of non-canonical RBPs associated with membrane trafficking and exocytosis, which we have named 'secretory-RBPs'. These included N-ethylmaleimide sensitive fusion protein (NSF) and vesicle-associated membrane protein 2 (VAMP2), whose binding to RNA was stimulated by glucose, driven by an increase in intracellular calcium. RNAs bound to NSF and VAMP2 were identified using eCLIP which demonstrated an enrichment of mRNAs encoding proteins associated with exocytosis, which was confirmed using EMSA and RIP.
Conclusion: An increase in calcium promotes the coordinated recruitment of a subset of mRNAs to secretory-RBPs, which we hypothesise modulates their localisation and/or expression, thus revealing a hitherto unknown link between gene expression and insulin exocytosis.
Support Information: This work was/is supported by the Diabetes Research and Wellness Foundation, the European Molecular Biology Organisation, the Leverhulme Trust, and Diabetes UK.

P17 | Mild hyperglycaemia impairs glucose metabolism in pancreatic islets

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Aims: We have previously reported that severe hyperglycaemia (>20 mmol/L) leads to impaired mitochondrial and glycolytic metabolism, along with reduced insulin content, in pancreatic beta cells. However, individuals with type 2 diabetes often experience only a mild elevation in glycaemia at the time of diagnosis (≥11.1 mmol/L random blood glucose). Therefore, in the current study we have investigated to what extent mild hyperglycaemia is detrimental to the pancreatic beta cell.
Methods: We utilised the βV59M mouse model whereby hyperglycaemia/diabetes is initiated via a tamoxifen-inducible KATP channel activating mutation in pancreatic beta cells. Following a low dose of tamoxifen (25 mg/kg), random fed blood glucose of βV59M mice increased from 8.2 ± 0.2 mmol/L to 13.9 ± 0.2 mmol/L (mild hyperglycaemia: mild-HG). Islets were isolated after 2 weeks of mild-HG, and mitochondrial metabolism was assessed by oxygen consumption rate (OCR, Seahorse), glycolytic glyceraldehyde 3-phosphate dehydrogenase (GAPDH) activity was measured biochemically, and insulin content was determined by ELISA (Mercodia).
Results: Glucose-stimulated OCR was reduced in islets from βV59M mice with mild-HG (control = 172.94 ± 11.55 vs mild-HG = 98.63 ± 8.37% increase in OCR in response to 20 mmol/L glucose, $p < 0.0001$; $n = 19–20$). GAPDH activity was reduced in mild-HG islets (control = 22.27 ± 0.84 vs mild-HG = 9.19 ± 1.02 pmol NADH/min/islet, $p < 0.0001$; $n = 4$). Insulin content was also reduced in mild-HG islets (control = 79.08 ± 6.28 vs mild-HG = 37.36 ± 3.58 ng/islet, $p < 0.01$; $n = 3$).
Conclusion: These data show that just a small increase in blood glucose is detrimental to the pancreatic beta cell and highlights the importance of maintaining blood glucose within a normal, healthy range.

P18 | Identification of islet cellular expression of key g protein-coupled receptor (GPCR) regulatory protein mRNAs and alterations in obesity using multi-transcriptomics and RT-qPCR analyses

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Aims: GRK and RGS proteins are key regulators of GPCR signalling. Here, we defined their mRNA expression profiles in human and mouse islets and determined whether alterations occurred in obesity.
Methods: Human (GSE217837) and mouse (GSE203151) islet single-cell RNA-seq (scRNAseq) databases were analysed by Scanpy (Python) to determine GRK1–7 and RGS1–22 mRNA expression by islet cells, and we used RT-qPCR to quantify their levels in islets obtained from lean (BMI: 22.9 ± 0.42; $n = 7$) and obese (BMI: 31.0 ± 0.49; $n = 7$) donors.
Results: scRNAseq databases revealed transcripts for GRK2, -3, -4, -5 and -6 in both human and mouse islets, with GRK3 showing highest expression. In mouse islets, GRK3 was predominantly expressed by beta cells, but it was mainly expressed by alpha and delta cells in human islets. RGS2, -4, -7, -9, -16 and -17 were most highly expressed by beta cells in both species, while RGS13, -14, -18, -21 and -22 transcripts were absent. In mouse and human islets, RGS4 and RGS9, respectively, were the most abundant beta cell RGS transcripts. Comparison of GRK and RGS mRNA expression in islets of lean and obese donors indicated a significant increase in GRK2 (203.3 ± 21.4% lean controls, $p = 0.03$) and GRK3 (237.8 ± 74.8% lean controls, $p = 0.009$) mRNAs, while RGS2 was decreased (38.8 ± 17.0% lean controls, $p < 0.0001$).
Conclusions: GRK2/3 mRNAs are highly expressed by human islets and upregulated in obesity. Several RGS mRNAs are expressed by beta cells but only RGS2 changes in obese donors. These data suggest altered roles for GRK2/3 and RGS2 in islet GPCR regulation in obesity.

P19 DUK | AMP-activated protein kinase (AMPK) activator, O-304, regulates pancreatic alpha cell function in a glucose-dependent manner

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Background/Aims: Low blood glucose (hypoglycaemia) is a severe complication associated with insulin-treated diabetes. Pancreatic alpha cells secrete glucose-raising

hormone glucagon to help counteract hypoglycaemia, which is at least in part coupled to changes to intracellular metabolism. However, with increasing disease duration and by poorly understood mechanisms, alpha cells insufficiently respond to hypoglycaemia. The well-characterised metabolic regulator, AMP-AMPK, has been shown to stimulate low glucose-stimulated glucagon secretion. We sought to determine whether activating AMPK, using a clinically tested (phase IIa) drug (O-304), could alter function of mouse pancreatic alpha cells (αTC1.9) and *ex vivo* islets.

Methods: Seahorse XFe96 flux analyser measured glucose utilisation after glucose injection (extracellular acidification rate; ECAR). AMPK pathway activation was examined by downstream substrate acetyl-CoA carboxylase (ACC, Ser79) protein phosphorylation following immunoblotting. L-lactate secretion was measured using a fluorescence-based assay. Glucagon content was examined using Promega Lumit™ luminescence-based immunoassays.

Results: O-304 (5.0 μmol/L) enhanced AMPK pathway activation (0.5 mmol/L glucose; $p<0.05$, $n=3$). AMPK inhibitor SBI-0206965 attenuated O-304-induced glucose utilisation (0.5 mmol/L glucose; $p<0.0001$, 11.7 mmol/L glucose; $p<0.001$, $n=10$–12) and lactate secretion (5.5/11.7 mmol/L glucose; $p<0.0001$, $n=3$). O-304 reduced islet glucagon content in a glucose-dependent manner ($p<0.05$, $n=12$–16).

Conclusion: O-304 reduced glucagon content, which may contribute towards anti-hyperglycaemic action previously shown in published *in vivo* studies. Taken together, these data suggest the potential therapeutic use of AMPK activators to directly modulate alpha cell glucagon secretory dynamics in diabetes.

P20 | Mesenchymal stromal cell-derived extracellular vesicles improve islet survival and function

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Introduction: Co-culture of islets with mesenchymal stromal cells (MSCs) enhances islet graft functional survival both *in vitro* and *in vivo*, which is associated with the transfer of mitochondria from MSCs to beta cells. MSC-derived extracellular vesicles (EVs) have regenerative properties; therefore, here we investigated their effects on islet function and as a route for the transfer of mitochondria.

Methods: Mitochondria in mouse Bm-MSCs were labelled with CellLight-Bacman-GFP (16h) then incubated (48h) in medium supplemented with exosome-free FBS (10%). EVs were purified from this conditioned medium (CM) using a Total Exosome isolation kit (ThermoFisher) and characterised by Nanosight and immunoblotting. MIN6 beta cells or isolated mouse islets were treated with either CM or purified EVs (72h), after which mitochondria transfer was assessed by flow cytometry and confocal microscopy. Islet function was assessed by measuring cytokine-induced apoptosis (caspase 3/7) and glucose-stimulated (20 mM) insulin secretion (GSIS).

Results: MSC-derived EVs increased GSIS (138% of control, $p<0.001$) and protected against cytokine-induced apoptosis (37% of control, $p<0.01$) at concentrations of 5×10^5 to 2×10^6 particles/mL. Lower concentrations ($<4\times10^5$ particles/mL) had no significant effects. GFP^+ mitochondria from MSCs were detected in MIN6 cells and islets after treatment with either CM (0.18% of GFP-area/cell) or purified EVs (0.15%). This was significantly decreased when intact mitochondria were removed from CM (0.02%, $p<0.001$) and EV (0.008%, $p<0.01$) by prior ultrafiltration.

Conclusion: MSC-derived EVs are alone sufficient to recapitulate some of the beneficial effects of MSC co-culture on islet function. These effects may be mediated by EV-dependent transfer of mitochondria.

P21 | Mechanistic target of rapamycin complex 1 signalling promotes glycogen storage during chronic hyperglycaemia in ins-1 pancreatic beta cells

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Aim: Chronic hyperglycaemia causes marked accumulation of glycogen in pancreatic beta cells but the mechanisms regulating glycogen storage in beta cells remain unclear. Having previously shown that chronic hyperglycaemia causes hyperactivation of mechanistic target of rapamycin complex 1 (mTORC1), in this study we investigated whether inhibiting mTORC1 signalling through ribosomal protein S6 kinase beta-1 (S6K1) or activating

AMP-activated protein kinase (AMPK), can modulate beta cell glycogen accumulation.

Methods: INS-1832/13 cells were cultured for 48h at 5 mmol/L glucose (LG-cells) or 25 mmol/L glucose (HG cells) with or without 10 μmol/L PF-4708671 or 0.5 μmol/L MK-8722. Glycogen was quantified colorimetrically using an enzymatic assay and normalised to total protein (determined by BCA assay). Gene expression was measured by qPCR.

Results: Chronic hyperglycaemia increased the glycogen content of INS-1 cells by 768% ± 162% from 0.29 to 1.69 mcg/mL protein ($n = 8$). The S6K1 inhibitor PF-4708671 largely prevented glycogen storage in HG-cells ($p < 0.0001$): glycogen levels were only 0.48 mcg/mL protein in HG-cells cultured with PF-4708671. The AMPK activator MK-8722 increased glycogen levels in HG-cells by 1.8-fold ($p = 0.0016$). Protein targeting to glycogen (PTG) mRNA was upregulated 25-fold in HG-cells ($p = 0.0013$). PTG mRNA levels in HG-cells were reduced 68% by PF-470867 and increased a further 57% by MK-8722.

Conclusions: Activation of mTORC1/S6K1 signalling contributes to hyperglycaemia-induced glycogen storage in beta cells. Although AMPK and mTORC1 signalling generally have opposing effects, AMPK activation unexpectedly stimulated glycogen accumulation further. These effects appear to be partially mediated by PTG, a glycogenesis-promoting regulatory subunit of protein phosphatase 1.

P22 | Loss of electrical beta to delta cell gap junctional coupling in pancreatic islets leads to impaired hypoglycaemia-induced glucagon secretion

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Refer to Oral number A47.

P23 DUK | An islet-protective role for native pancreatic mesenchymal stromal cells in health and in type 1 diabetes

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Refer to Oral number A43.

P24 DUK | Investigating the contribution of pre-pubertal and post-pubertal oestradiol in female protection in a mouse model of beta cell endoplasmic reticulum (ER) stress

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Refer to Oral number A40.

P25 | Establishing an *in vitro* human model of islet-derived pancreatic stellate cells to study endocrine-exocrine cross-talk

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Refer to Oral number A44.

P26 | Differential CpG methylation at *Nnat* in the early establishment of beta cell heterogeneity

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Aims: Beta cells within the pancreatic islet represent a heterogenous population wherein individual subgroups of cells make distinct contributions to the overall control of insulin secretion. At present, the molecular mechanisms through which beta cell hierarchy is established are poorly understood. Changes at the level of the epigenome provide one such possibility.

Methods: Single cell RNA-seq data sets were examined using Seurat 4.0 and ClusterProfiler. Transgenic mice expressing eGFP under the control of the *Nnat* enhancer/promoter regions were generated for fluorescence-activated cell sorting of single beta cells and downstream analysis of CpG methylation by bisulphite and RNA sequencing respectively. Animals deleted for the de novo methyltransferase, DNMT3A were used to explore control of promoter methylation. Ca^{2+} dynamics was explored by rapid confocal imaging of Cal-520 and Cal-590.

Results: *Nnat* mRNA was differentially expressed in a discrete beta cell population in a developmental stage- and DNA methylation (DNMT3A)-dependent manner. NNAT expression is also restricted to a subset of beta cells across the human islet that is maintained throughout adult life. $NNAT^{+}$ cells also displayed a discrete transcriptome at adult stages, representing a sub-population specialised for insulin production, and reminiscent of recently described beta HI cells. Hub cells were less abundant in the $NNAT^{+}$ population.

Conclusions: These findings demonstrate that differential DNA methylation at *Nnat* represents a novel means through which beta cell heterogeneity is established during development. Changes in methylation at this locus may thus contribute to a loss of heterogeneity, and defective insulin secretion, in some forms of diabetes.

Basic and clinical science posters: Brain function

P27 DUK | Investigation of insulin and C3 treatment on gene expression in the human SH-SY5Y neuronal cell line

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Aims: Insulin resistance is a key mechanism in the development of type 2 diabetes, associated with defects in both metabolic processes and cognitive function. Previous work has shown that brain insulin signalling is important for multiple processes across the body, however, the key neurological processes regulated in the brain by insulin are still not fully understood. The aims of this project were to identify the transcriptional changes induced by insulin treatment in human SH-SY5Y neuroblastoma cells, determine whether differentiating the cells into a more neuronal-like phenotype would affect these expression changes and to investigate the effects on insulin-mediated gene expression of an inhibitor (C3) known to modulate insulin receptor action in the periphery.

Methods: Western blotting experiments were used to validate optimal dose and time parameters. Gene transcriptional changes were then compared ± insulin/C3 in both undifferentiated and differentiated SH-SY5Y cells, using RNA-sequencing and bioinformatics approaches.

Results: In undifferentiated cells, 20 genes were significantly upregulated (adjusted p-value < 0.05) with fold-change of $>+1.00$ and 25 significantly downregulated with fold-change of <-1.00. This compares to 10 genes upregulated $>+1.00$ and 14 genes downregulated <-1.00 in differentiated SH-SY5Y. C3 treatment combined with insulin resulted in 120 downregulated genes and 20 upregulated genes fitting this criteria in undifferentiated cells but only four significantly downregulated (and no significantly upregulated genes) were discovered in differentiated cells treated with C3 and insulin.

Conclusions: Overall, this work has the potential to increase the understanding of how insulin functions in neuronal cells.

Basic and clinical science posters: Cardiovascular

P28 | Effect of dual sodium-glucose cotransporter 1 (SGLT1)/sodium-glucose cotransporter 2 (SGLT2) inhibitor sotagliflozin on heart failure in type 2 diabetes: A systematic review and meta-analysis of randomised controlled trials

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Aims: The effects of sotagliflozin, a novel SGLT 1 and 2 inhibitor, on heart failure (HF) have not been explored. This systematic review evaluated the effect of sotagliflozin on HF and cardiovascular outcomes in participants with type 2 diabetes.
Methods: Scopus, Medline, Embase and Central were searched from database inception until 2nd of June 2023. Randomised controlled trials evaluating sotagliflozin in type 2 diabetes participants and reporting HF events were selected. Additionally, major adverse cardiovascular events (MACE) and systolic blood pressure were evaluated. The Cochrane risk of bias 2 tool was used. Pooled mean difference (MD), relative risk (RR), 95% confidence intervals and the number needed to treat were estimated. (PROSPERO: CRD42023432732).
Results: Nine studies were included in this review ($n=15{,}320$ participants; intervention $n=8{,}040$, control $n=7{,}280$). The median follow-up was 13.4 months (Q1 = 13, Q3 = 21). One study recruited participants with HF at baseline. After a follow-up of >52 weeks, sotagliflozin significantly reduced the risk of composite HF events [$n=8$ studies; RR = 0.66 (0.64, 0.69)] and MACE [$n=8$ studies; RR = 0.73 (0.66, 0.81)]. The number needed to treat for these outcomes was 20 and 26 respectively. Additionally, sotagliflozin significantly lowered systolic blood pressure [$n=7$; MD = −2.38 mmHg (−2.79, −1.97)]. High risk of bias was identified as a limitation of this review.
Conclusion: Sotagliflozin reduced HF and cardiovascular events in participants with type 2 diabetes. Additional research exploring its effects in participants with HF is warranted, as well as direct comparisons with currently used SGLT2 inhibitors, to determine whether dual SGLT inhibition surpasses selective in-hibition.

P29 | Mean arterial pressure (MAP) and recorded coronary artery disease: A perspective on risk

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Introduction: MAP and pulse pressure (PP) are markers of vascular health and relate to incident cardiovascular (CV) events. We here report the relation between MAP and PP with recorded CV events in a long-term prospective cohort of individuals with type 2 diabetes from the DARE England cohort who were monitored through their GP surgeries.
Methods: 1,132 individuals with type 2 diabetes were followed up for up to 25 years following diagnosis. Using both univariate Spearman correlation and multivariate logistic regression, we related the most recent MAP and PP to coronary disease (CAD = MI/angina/revascularisation/CV death) as recorded in the GP record, while also taking account of glycated haemoglobin (HbA1c).
Results: 37.3% of individuals were diagnosed with a CV event at the last follow-up. In univariate analysis, HbA1c was not associated with higher MAP ($p=0.07$). There was an independent relation between lower MAP and recorded CAD (odds ratio (OR) 0.987 (95% CI) 0.975–0.999), which was independent of age (1.057 (1.043–1.071)), female sex (0.489 (0.372–0.644)), black ethnicity (0.243 (0.0.055–1.076)), Townsend Index (a measure of deprivation) (1.059 (1.020–1.099)), HbA1c (0.996 (0.99–1.005)) and PP, (0.998 (0.990–1.005)) which was not found to be associated with incident CAD.
Conclusion: Our findings indicate an association between lower MAP (but not PP) and incident CAD over time in people with type 2 diabetes. This is in keeping with previous studies in individuals without type 2 diabetes which describe MAP as a marker of tissue perfusion and suggest that this easily derived measure has potential utility in relation to CV risk evaluation in individuals with type 2 diabetes.

P30 DUK | Bactericidal/permeability-increasing fold-containing family b member four (*BPIFB4*) longevity protein therapy to protect the heart from type 2 diabetes

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Aims: The aim of the study was to show the longevity-associated variant of the *BPIFB4* gene *(LAV-BPIFB4)* has potential to improve cardiac function in diabetic cardiomyopathy when given as a protein formulation.
Methods: Immunofluorescent (IF) staining and Western blotting of coronary artery endothelial cells (CAEC), cardiac pericytes (CP) and cardiomyocytes to demonstrate *BPIFB4* expression and *LAV-BPIFB4* uptake. Treatment of aged mice ($n=6$/group) with 3 μg *LAV-BPIFB4* or vehicle orally every 3 days for 2 weeks to demonstrate effect on cardiac function.
Results: Western blots demonstrated constitutive expression of *BPIFB4* in CAEC and CPs ($n=4$). IF staining of CAEC and cardiomyocytes showed *BPIFB4* expression is perinuclear. Uptake of exogenously administered His-tagged *LAV-BPIFB4* by cardiomyocytes and CPs was confirmed by IF ($n=4$), with *LAV-BPIFB4* localised to the cell cytoplasm. Western blotting for His-tag demonstrated expression of *LAV-BPIFB4* in CAEC ($n=4$). *In vivo*, significant increases in both capillary ($p<0.04$) and arteriole ($p<0.008$) density were observed in hearts from LAV-treated mice compared with vehicle. All vessels showed increased CP coverage in the LAV-treated group ($p<0.02$ capillaries; $p<0.004$, arterioles). Hearts from the *LAV-BPIFB4*-treated group showed reduced interstitial fibrosis ($p<0.01$), attributed to less collagen deposition in the sub-endocardial region of the left ventricular wall ($p<0.015$). β-Galactosidase staining revealed less cellular senescence in *LAV-BPIFB4* hearts ($p<0.01$).
Conclusions: Exogenous *LAV-BPIFB4* can be taken up by human cardiac cells and has beneficial effects on neovascularisation, fibrosis and cell senescence in mouse hearts. Taken together, we predict when administered to a diabetic mouse model *LAV-BPIFB4* will promote similar beneficial effects on the heart leading to improved functional outputs.

P31 | Cardiovascular outcomes with intravitreal anti-vascular endothelial growth factors (VEGF) therapy in patients with diabetes: A real-world data analysis

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Aims: We assess possible links between cardiovascular disease (CVD) events and intravitreal anti-VEGF in patients with diabetes and various eye diseases (age-related macular degeneration, diabetic macular oedema and retinal vein occlusion) from a real-world database.
Methods: Data were analysed using TriNetX, a global electronic medical database ($n=110{,}048{,}154$). The study included adults with diabetes. Patients with a history of CVD were excluded. They were categorised into anti-VEGF or control groups (laser or steroid therapies). Cohorts were 1:1 propensity score-matched for age, sex, ethnicity, body mass index, systolic blood pressure, HbA1c and cardiovascular medications ($n=1{,}822$). Outcomes analysed at 1, 6 and 12 months were: (1) mortality, (2) acute myocardial infarction (MI), (3) ischaemic stroke and (4) heart failure.
Results: We demonstrate that in patients with diabetes, anti-VEGF therapy is not associated with increased CVD risk over 1, 6 and 12 months: Mortality over 1 month (RR n/a; 10/0: 10 events in anti-VEGF group/no events in control group), 6 months (RR 1.462; 95% CI 0.724, 2.95) and 12 months (RR 1.414; 95% CI 0.883, 2.265); acute MI over 1 (RR n/a; 0/0), 6 and 12 months (RR n/a; 0/10); ischaemic stroke 1, 6 months (RR n/a; 0/0), and 12 months (RR n/a; 0/10); and heart failure over 1 month (RR n/a; 0/0), 6 months (RR 1; 95% CI 0.417, 2.397) and 12 months (RR 1; 95% CI 0.417, 2.397).
Conclusion: The present study demonstrates no increased risk of cardiovascular-related events in the short or medium term in people with diabetes given anti-VEGF therapy.

Basic and clinical science posters: Cell signalling, endocrinology and metabolism

P32 DUK | The acetylation status of STAT1 modulates its cytotoxic activity in beta cells

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Introduction: Activation of STAT1 in pancreatic beta cells by pro-inflammatory cytokines leads to the upregulation of human leukocyte antigen class I (HLA-ABC) and may contribute to the presentation of self-antigens during autoimmunity. Mitigating STAT1 signalling is therefore an important therapeutic goal as this will slow the rate of autoimmune-mediated beta cell loss in type 1 diabetes. We now show that lysine-deacetylase, *HDAC6* modulates STAT1 signalling, and we suggest that targeted inhibition of *HDAC6* may provide an alternative means to protect beta cells from cytotoxicity.
Methods: Human EndoC-βH1 cells were used and cell viability assessed by flow cytometry. Protein interactions were studied by coimmunoprecipitation and Western blotting. *HDAC6* expression was attenuated using siRNA and STAT1 activity measured by luciferase reporter construct. Gene expression changes was studied by RT-qPCR.
Results: EndoC-βH1 treated with IFNγ displayed a significant deacetylation of STAT1 relative to controls (control-14.46 ± 2.15 AU, IFNγ-1.94 ± 0.13 AU; $p < 0.01$ densitometry). The presence of selective *HDAC6* inhibitor (BRD9757) prevented the deacetylation of STAT1 under these conditions (IFNγ + BRD9757-9.5 ± 2.5 AU; $p > 0.05$) and reduced STAT1 activity as judged by luciferase reporter (IFNγ-15.08 ± 0.84-fold activation; IFNγ + BRD9757-7.2 ± 0.4-fold; $p < 0.001$). The use of siRNA to reduce *HDAC6* expression protected beta cells from the detrimental actions of pro-inflammatory cytokines cocktail (IL1β, TNFα, and IFNγ) (control-32.7 ± 2.3%, siHDAC6-36.5 ± 0.9%, cytokines-67.8 ± 1.7%, siHDAC6 + cytokines-55.7 ± 1.1% cell death $p < 0.001$). Similar results were obtained when cells were exposed to BRD9757 to inhibit *HDAC6* activity. Knockdown of *HDAC6* also resulted in reduced expression of the STAT1-responsive gene Mx1 in cells exposed to IFNϒ ($p < 0.001$).
Conclusion: The results suggest that inhibition of *HDAC6* may represent a novel approach to preserve beta cell in type 1 diabetes since this leads to enhanced STAT1 acetylation and a concomitant attenuation of pro-apoptosis signalling.
Acknowledgement: IBEx.

P33 DUK | Effect of asymmetric dimethyl arginine (ADMA) on target of rapamycin (TOR) and lipogenic protein levels

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Aims: Increased ADMA levels are associated with insulin resistance and obesity. We have previously demonstrated that ADMA increased adipocyte triglyceride levels, through a novel mechanism involving TOR and independent of any inhibitory action of ADMA on NO synthesis. Using 3T3-L1 adipocytes and HepG2 cells, we further characterised the effect of ADMA on TOR and lipogenic protein levels.
Methods: 3T3-L1 adipocytes or HepG2 cells were treated with ADMA (1–10 μM), the related methylarginine SDMA (10 μM) or the NO synthase inhibitor L-NAME (1 mM) for 48h. Levels of lipogenic proteins (acetyl-CoA carboxylase (ACC), fatty acid synthase (FASN)), TOR complex proteins (Raptor for TORC1, Rictor for TORC2), TORC1 activity (p70S6K T389 phosphorylation) and TORC2 activity (Akt S473 phosphorylation) were assessed by immunoblotting.
Results: Incubation of 3T3-L1 adipocytes with ADMA had no effect on Raptor or phosphorylation of either p70S6K or Akt. In contrast, ADMA increased levels of Rictor (1.94 ± 0.44-fold; $p < 0.05$; $n = 3$). Neither SDMA nor L-NAME had any effect on any protein examined. In HepG2 cells, ADMA had no effect on TOR levels, or phosphorylation of either p70S6K or Akt. ADMA increased levels of FASN in both 3T3-L1 adipocytes and HepG2 cells. Levels of ACC were unaltered in HepG2 cells.
Conclusion: ADMA increased Rictor levels in 3T3-L1 adipocytes, suggesting increased TORC2 activity. ADMA increases lipogenesis in both 3T3-L1 adipocytes and HepG2 cells, associated with increased FASN levels. There was no concomitant change in TORC1/TORC2 activity. Our data reveal a role for ADMA in mediating FASN and lipogenesis in adipocyte and hepatocytes, potentially mediated by TORC2.

P34 DUK | Pyruvate kinase M2 is a target for mitigation of insulin resistance in skeletal muscle

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Refer to Oral number A38.

P35 DUK | Acetyl-CoA carboxylase 1 phosphorylation at serine1215 by 5′ AMP-activated protein kinase plays a critical role in embryonic development and glucose homeostasis in mice

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Refer to Oral number A48.

P36 DUK | Incretin metabolites GLP-1(9–36) and GIP(3–42) alter pancreatic morphology and protect beta cells in high fat fed mice

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Background/Aims: Truncated metabolites of incretins circulate as 60%–70% of total glucagon-like peptide (GLP)-1 and glucose-dependent insulinotropic peptide (GIP). This study aims to investigate their possible effects on islet morphology and cell immunoreactivity in high-fat diet (HFD) fed mice.
Methods: Male *Swiss* TO-mice (6–8 weeks old; $n = 5$) on a HFD or normal diet (ND) for 4 months received twice-daily subcutaneous injections of GLP-1(9–36) or GIP(3–42) (25 nmol/kg bw) or saline vehicle (0.9% (w/v) NaCl) over a 60-day period. Metabolic parameters were regularly monitored. Excised pancreatic tissues were used for immunohistochemical analysis.
Results: Mice fed HFD exhibited obesity, insulin resistance and glucose intolerance. Islet density in the pancreas was decreased significantly ($p < 0.05$) after HFD but normalised by GLP-1(9–36) treatment. Islet, beta and alpha cell areas increased significantly ($p < 0.01$) after HFD and were subsequently reduced ($p < 0.01$–$p < 0.001$) by GIP(3–42). GLP-1(9–36) also significantly decreased ($p < 0.01$) alpha cell area but failed to alter islet and beta cell areas compared to HFD mice. Neither GIP(3–42) nor GLP-1(9–36) altered the percentage of beta, alpha or central alpha cells. GIP(3–42) treatment significantly ($p < 0.05$) increased beta cell proliferation compared to ND group. While HFD increased ($p < 0.001$) beta cell apoptosis, both GIP(3–42) and GLP-1(9–36) significantly reduced ($p < 0.01$–$p < 0.001$) apoptosis compared to HFD mice. These observations were independent of changes in body weight and blood glucose control.
Conclusion: These data indicate that incretin metabolites GLP-1(9–36) and GIP(3–42), produced also by alpha cells under conditions of islet stress, impact pancreatic morphology, with a protective effect on beta cell health.

P37 DUK | Fructose-bisphosphatase 1 (Fbp1) is a target of the antihyperglycemic action of salicylate

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Aim: Recent evidence showed that the acute antihyperglycemic of metformin depends on an AMP inhibitory binding site on the gluconeogenic key enzyme Fbp1. We have investigated the antihyperglycemic effect of another diabetes drug, salicylate (SA), in wild-type and Fbp1 knock-in (KI) animals, and in WT hepatocytes and hepatocytes expressing a knock-in form of Fbp1 that is insensitive to AMP.
Methods: Male WT and Fbp1 KI animals were fed a high-fat diet ± SA and metabolic parameters assessed. Isolated hepatocytes from wild-type and knock-in animals were also extensively phenotyped.
Results: Male Fbp1 KI mice gained significantly more weight following HF feeding (WT = 15.7 ± 1.1 vs KI = 19.4 ± 0.8; $p < 0.05$) and had higher fat mass (%) compared to their WT littermates (WT = 30.5 ± 0.8 vs KI = 35.5 ± 0.9; $p < 0.01$). In addition, Fbp1 KI animals had impaired glucose tolerance (effect of genotype; $p < 0.05$) and were insensitive to SA supplementation (genotype × drug; $p < 0.05$). Basal glucose production was 35% higher in KI compared to WT hepatocytes after 12h. SA (≥2 mM, 12 h) reduced glucagon-stimulated glucose production (60%), activated AMPK phosphorylation and reduced protein synthesis in WT but not in KI hepatocytes. Proteomic analysis showed that mitochondrial related proteins were highly upregulated (425/1299 upregulated proteins) whereas 7/16 glycolysis-related enzymes were downregulated in KI compared to WT. The spare respiratory capacity (80%) and mitochondrial network formation was impaired in

KI hepatocytes (40%). *p* values of <0.05 or greater significance for all differences.
Conclusions: AMP insensitive Fbp1 KI animals and hepatocytes are resistant to salicylate.

P38 DUK | Oestrogen receptor modulation by ethinyl oestradiol alters pancreatic islet cell morphology and adaptation in female high-fat diet fed mice

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Refer to Oral number A41.

Basic and clinical science posters: Covid-19

P39 | Is long Covid-19 more common in people with diabetes? Evidence from a UK cohort

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Aims: In early 2020, it became apparent that a multi-system syndrome can develop following Covid-19 infection, now known as long Covid. Given that people with diabetes are at increased risk of poor outcomes following Covid-19 infection, we hypothesised that they may also be more susceptible to developing long Covid.
Methods: Using data extracted from the integrated Greater Manchester Care Record (GMCR) across 499 GP practices, we compared the prevalence of long Covid in people with diabetes to matched controls. We then determined the influence of other factors.
Results: Analysis revealed that people with diabetes are at no greater risk of developing long Covid. Interestingly in type 2 diabetes, the prevalence of long Covid in men (0.54%) and women (0.53%) was not different. Further analysis confirmed that diabetes individuals at older ages were at reduced risk of developing long Covid (OR 0.994, 95% CI [0.989, 0.999]). It also suggested a minor increased risk for females (OR 1.179, 95% CI [1.002, 1.387]) and that people of mixed ethnicity had a significantly increased risk of developing long Covid (OR 2.022, 95% CI [1.179, 3.467]). A higher BMI was associated with a small but significantly increased risk of developing long Covid (OR 1.013, 95% CI [1.001, 1.026]). The estimated general population prevalence of long Covid based on general practice coding was 0.5% of people with a prior Covid-19 diagnosis.
Conclusion: Overall, people living with diabetes are at no greater risk of developing long Covid than their non-diabetes controls when BMI is considered. There remains an imperative for continuing awareness of long Covid as a differential diagnosis for multi-system presentations in the context of a previous Covid-19 infection.

Basic and clinical science posters: Diet, obesity, exercise and inflammation

P40 DUK | Interrupting prolonged sitting with frequent, short bouts of light-intensity activity improves inflammatory and thrombotic vascular biomarkers in people with type 1 diabetes: The SIT-LESS randomised controlled trial

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Refer to Oral number A57.

P41 CS | High-intensity interval training (HIIT) with a very-low energy diet (VLED) compared to very low-energy diet monotherapy elicits differing outcomes on body composition and glycaemic parameters: A randomised-control trial

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Aims: Very-low energy diet (VLEDs) demonstrate type 2 diabetes remission and rapid weight loss, but the effects of concurrent exercise intervention on glycaemic parameters remain unclear. We explored the effects of HIIT co-administration across multiple body composition and glycaemic variables vs VLED monotherapy.

Methods: Unblinded, age-stratified, randomised-control, single-centre trial. Male participants ($n=15$) with either type 2 diabetes or prediabetes and overweight-to-obese status were enrolled and randomised to two 6 week intervention arms (VLED-only vs VLED-HIIT). Pre- and post-intervention body composition and multiple glycaemic parameters assessed. Statistical testing was performed utilising IBM SPSS (v28.0.1.1).

Results: Compared with VLED-only, VLED-HIIT ($n=8$) demonstrated superior reductions in weight (-11.55 ± 4.02 kg, $p<0.001$ vs -8.38 ± 2.85 kg, $p<0.001$), body mass index (-3.38 ± 0.98 kg/m^2, $p<0.001$ vs -2.6 ± 1.04 kg/m^2, $p=0.003$), total body fat ($-3.05\pm0.85\%$, $p<0.001$ vs $-2.40\pm1.67\%$, $p=0.016$) and trunk tissue fat ($-4.04\pm0.89\%$, $p<0.001$ vs $-3.17\pm2.1\%$, $p=0.014$). Compared with VLED-HIIT, VLED-only ($n=7$) demonstrated superior oral glucose tolerance test changes (1-h: -3.66 ± 1.12 mmol/L, $p<0.001$ vs -2.79 ± 2.07 mmol/L, $p=0.011$; 2-h: -3.85 ± 1.26 mmol/L, $p=0.001$ vs -1.45 ± 1.55 mmol/L, $p=0.035$; area under curve: -8.42 ± 1.77 mmol min/L, $p<0.001$ vs -5.35 ± 3.81 mmol min/L, $p=0.009$). Lean body mass was reduced in both groups (VLED-only: -2.59 ± 2.98 kg, $p=0.058$; VLED + HIIT: -3.60 ± 1.54 kg, $p=0.001$) but no difference between groups.

Conclusions: Metabolic outcome differentials following HIIT incorporation with VLEDs in this patient demographic are demonstrated. Replication of these novel findings may support future personalisation in type 2 diabetes management.

P42 DUK | Physical activity levels in people with type 1 diabetes and insulin resistance (IR): A cross-sectional observational study

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Aim: The aim of the study was to characterise activities of daily living in people with type 1 diabetes with and without insulin resistance.

Methods: Using a cross-sectional observational design, we profiled free-living physical activity behaviour using wearable accelerometers for two consecutive weeks in patients with type 1 diabetes. Estimated glucose disposal rate, a validated measure of IR, was calculated using an established formula to classify individuals according to IR status; a cut-point of <8 mg/kg/min signified IR. Differences between dichotomised variables were assessed using independent *t*-tests or Mann–Whitney *U*-tests.

Results: Of 36 adults with type 1 diabetes [age 24.0 ± 3.1 years, 75% males, diabetes duration 14.5±10.5 years, body mass index 26.9±7.1 kg/m^2, glycated haemoglobin 64 ± 19 mmol/mol], the 13 (36%) participants with IR walked for a shorter duration of time (1.15±0.16 vs 1.63±0.76h, $p<0.001$), with fewer resultant daily steps (6009±2251 vs 7682±3754 steps, $p=0.010$) and a lower metabolic equivalent of task minutes per week (609.6±342.5 vs 1080.0±705.1, $p=0.0042$) compared to those without IR. There were trends towards less time spent standing (2.78±1.22 vs 3.42±2.31h, $p=0.056$), fewer number of daily sit-to-stands (40.0±19.8 vs 49.5±12.4; $p=0.10$), and more time spent sitting (7.70±2.38 vs 6.37±2.65h, $p=0.070$) or asleep (9.65±1.08 vs 9.38±1.67h, $p=0.063$) in patients with IR compared to those without. Time spent lying and driving was comparable between groups.

Discussion: Patients with type 1 diabetes and concomitant IR are less physically active and display more sedentary behaviours. Given the prevalence of IR in the type 1 diabetes population and its association with complications, interventions that target physical inactivity should be widely promoted.

P43 | Association between hepatic fat, insulin resistance and fibro-inflammatory markers in adults with obesity type 2 diabetes

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Aims: We aimed to assess whether the association between hepatic fat and insulin resistance is mediated by circulating fibro-inflammatory biomarkers.

Methods: Secondary analysis of the DIASTOLIC study (NCT02590822) comparing individuals with obesity and type 2 diabetes free of symptomatic cardiovascular disease ($n=81$) verses healthy controls without diabetes ($n=35$). Hepatic fat was quantified using fat-water magnetic resonance imaging; insulin resistance via homeostatic model assessment (HOMA-IR); and plasma fibro-inflammatory biomarkers via multiplex panel (49 analytes) (Bristol-Myers Squibb). Univariable and multivariable regression determined associations of hepatic fat with HOMA-IR and circulating fibro-inflammatory biomarkers, adjusting for age, sex, ethnicity and body mass index. Mediation analysis (Sobel test) determined whether identified fibro-inflammatory biomarkers mediated the relationship between hepatic fat and HOMA-IR.

Results: Those with diabetes (50.2 ± 6.6 years, 59% male, 62% White European) had a higher HOMA-IR [9.4 (6.5–13.7) vs 1.6 (1.1–2.3) $p<0.001$] and hepatic fat [13.8% (7.2–23.6%) vs 2.9% (2.5–3.6%) $p<0.001$] compared with controls (48.7 ± 6.3 years, 54% male, 66% White European). In pooled analyses, HOMA-IR was independently associated with hepatic fat ($\beta=0.217$, 95% confidence interval 0.073, 0.36, $p=0.005$). Six pro-fibrotic biomarkers [chitinase-3-like protein 1, growth/differentiation factor-15, interleukin-8, matrix metalloproteinase-2, neutrophil gelatinase-associated lipocalin, plasminogen activator inhibitor-1 (PAI-1)] were independently associated with hepatic fat. Mediation analysis revealed that the relationship between hepatic fat and HOMA-IR is mediated by PAI-1 ($p=0.04$), a promoter of collagen deposition.

Conclusion: The association between hepatic fat and insulin resistance is potentially mediated by circulating levels of PAI-1. This finding requires validation in additional cohorts and studies to understand potential mechanisms.

P44 | The impact of a low-calorie diet intervention or magnetic resonance imaging-determined ectopic fat deposition: Preliminary results from CALIBRATE

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Aims: We sought to identify whether young adults with obesity, at high risk of non-alcoholic fatty liver disease (NAFLD), demonstrate liver fat change after low-calorie diet intervention.

Methodology: CALIBRATE is a randomised controlled trial assessing long-term changes in liver fat following 12 weeks of low-calorie diet (800 kcal/day). Participants with obesity (without type 2 diabetes), aged 18–55 years, were randomised to total diet replacement (TDR) or modest lifestyle intervention. Baseline assessments included metabolic profiling and abdominal magnetic resonance imaging (MRI); repeated at 12 weeks and 12 months.

Results: We present median (range) pooled results from both arms ($n=12$). At baseline, bodyweight (BW), body mass index (BMI) and waist circumference (WC) were 113.5 kg (47.0), 36.1 kg/m^2 (15.1) and 114.0 cm (31.0) respectively. Participants had normal HbA1c (37.5 mmol/mol (10.0)), but abnormal lipid profile (total cholesterol 6.0 mmol/L (3.5) and low-density lipoprotein (LDL) 3.8 mmol/L (3.1)), Fatty Liver Index (FLI) (90.5 (22.4)) and MRI-determined proton density fat fraction (PDFF) (9.5% (31.4%); normal <5%). WC correlated with PDFF (r 0.53 (p 0.01)). At 3 months, Δ change in BW (13.3% (19.9%)) ($p=0.01$), BMI (13.4% (19.5%)) ($p=0.04$) and WC (12.5% (18.7%)) ($p<0.01$) accompanied reductions in FLI (25.7% (59.5%)) ($p<0.01$) and PDFF (36.2% (58.9%)) ($p=0.34$), but not HbA1C (0.0% (14.5%)) ($p=1.00$). At 12 months, Δ change from baseline are reported for BW (2.2% (26.6%)), BMI (5.9% (26.2%)), WC (7.1% (25.2%)), HbA1C (+ < 0.1% (0.4%)), FLI (8.6% (35.6%)) and PDFF (22.7% (91.5%)).

Conclusion: Lifestyle intervention produces weight loss and improved body composition in people with obesity, which may return to baseline after intervention cessation.

Acknowledgement: Metabolism and Nutrition Research Group.

Basic and clinical science posters: Early detection and prevention

P45 | Sphingolipid and ceramide profiles in obese people with type 2 diabetes and the response to a 12-week low-energy diet

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Aims: The aims of the study were to determine (1) sphingolipid/ceramide profile in obese people with type 2 diabetes without cardiovascular disease compared to healthy controls and (2) the impact of a low-energy meal-replacement plan (MRP).

Methods: Post hoc analysis of a randomised controlled trial (NCT02590822) in those with type 2 diabetes who completed a 12-week MRP (~810 kcal/day) and nested case–control study. Echocardiography, cardiac MRI (CMR) and fasting bloods for lipidomics were undertaken pre/post-intervention. Principal component analysis (PCA) and differential expression analysis were undertaken. Correlation analyses was conducted to determine whether candidate lipids were related to cardiac structure/function and key metabolic measures.

Results: Twenty-four people with type 2 diabetes (15 males, age 51.1 ± 5.7 years, BMI 37.4 ± 5.9 kg m^{-2}) and 25 controls (15 male, 48.3 ± 6.6 years, BMI 24.3 ± 2.5 kg m^{-2}) were included. Subjects with type 2 diabetes had increased left ventricular mass: volume ratio (0.84 ± 0.13 vs 0.70 ± 0.08, $p < 0.001$) and systolic function but impaired diastolic function compared with controls. Lipid profiles discriminated between case–controls on PCA. At baseline 14 sphingolipids/ceramides (including six ceramides, four acylcarnitine's and sphinganine-1-phosphate) were up/downregulated of which five were positively correlated with insulin resistance (all $r \geq 0.6$, $p < 0.001$), aortic stiffness (all $r \geq 0.3$, $p < 0.004$) and left ventricular hypertrophy (mass: volume ratio) (all $r \geq 0.3$, $p < 0.008$). Nine of the candidate lipids significantly increased towards control levels post-MRP.

Conclusions: People with type 2 diabetes and obesity have altered sphingolipid/ceramide profile compared to controls. Nine candidate lipids recovered towards control levels following MRP, five of which were correlated with cardiovascular remodelling and may be implicated in the pathogenesis of diabetic heart disease. Future studies are required to validate these findings.

P46 DUK | Low titre insulin autoantibodies (IAA) are predictive of type 1 diabetes

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Aim: IAA are essential to type 1 diabetes risk prediction but are the most challenging to measure. Our aim was to determine whether IAA levels influence prediction of future diabetes in relatives of children with type 1 diabetes.

Methods: From 4838 relatives of people with type 1 diabetes participating in the Bart's Oxford study screened for IAA/GADA/IA-2A and ZnT8A, we identified 183 (3.8%) positive for IAA by radiobinding assay (RBA) (median sampling age 29.3 years, range 2.1–60.2; median follow-up 16.5 years, 0.3–36.1). Of these, 121 (66.1%) were single IAA, 28 were IAA + 1 (15.2%), and 34 IAA + 2 (18.6%). Diabetes was diagnosed in 48 (26.2%). In addition, of 4310 islet autoantibody negative relatives (median follow-up 19.9 years, 0.5–36.8 years) 13 (0.3%) developed type 1 diabetes. A positive threshold of 0.2 units was the 97.5th percentile of 2860 schoolchildren.

Results: In 183 IAA-positive relatives, the median level was 0.62 units. Individuals with low level IAA (1st quartile of positive) had a higher 20-year risk of diabetes, 19.5% (95% 10.5–34.6), compared with islet autoantibody negative relatives 0.3% (95% CI 0.2–0.6) ($p < 0.001$). The 20-year risk in those with IAA alone (1st quartile) was 13.5% (5.1–32.7) compared with 15.3 (9.0–25.6) in IAA alone (all titres). Log rank test for trend showed an increase in progression to diabetes across the four quartiles of IAA level ($p < 0.001$), but there was no difference between consecutive quartiles.

Conclusion: Even low-level IAA detected by RBA are able to identify people at higher risk of progression to diabetes. Testing for IAA using sensitive assays is an essential consideration for screening strategies.

P47 | Mismatch between HbA1c and fasting glucose in ethnic and gender groups

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Aims: Previous research has shown that a mismatch can occur between HbA1c and fasting glucose, which may be increased in certain ethnic groups. This study aimed to combine the most recent NHANES data to create a larger data set than previous studies, not only identifying differences between ethnic groups, but also analysing age, BMI and gender groups.
Methods: Batches of NHANES data were combined using R software. This produced a larger data set than in previous studies. The participants were divided into Black and White ethnic groups ($n = 13{,}499$). The HbA1c mismatch in each ethnic group was analysed, to observe differences between ethnic groups. This procedure was repeated for gender ($n = 20{,}416$), age and BMI groups. This was also repeated for three retinopathy severity level groups.
Results: This suggested that the mismatch between HbA1c and fasting glucose was different between the ethnic groups and between the gender groups, but not between age groups or BMI groups. Between the three retinopathy severity level groups, it was found that both HbA1c and fasting glucose increased as retinopathy severity increases, but no difference was found in HbA1c mismatch.
Conclusions: The glycaemic index gap or HbA1c mismatch varies between ethnic and gender groups, but not between BMI, age or retinopathy groups. It could be useful to develop customised HbA1c thresholds to use for diagnosing diabetes in certain ethnic and gender groups, to account for mismatch between these groups.
Acknowledgement: Exeter Centre of Excellence in Diabetes (ExCEED).

Basic and clinical science posters: Epidemiology

P48 | The impact of age and sex on glycated haemoglobin (HbA1c): Confirmation of the differences between older and younger men and women using fasting glucose and HbA1c checked on the same day

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Introduction: While HbA1c has become a validated measure of glycaemic status, fasting glucose (FG) also can also be used to detect inherent glucose dysregulation. We now examine the relation between these parameters to explore potential diagnostic impact.
Methods: Using data from a population diagnosed with type 2 diabetes between 2009 and 2020, we analysed the relation between FG/HbA1c in 4108 individuals who had undergone a check of FG/HbA1c on the same day to derive the linear equations for men/women of 50 years or younger, and over 50 years, in order to compare the expected FG that corresponds to diagnostic cut-off HbA1c = 48 mmol/mol for each group.
Results: The overall linear model between fasting glucose and HbA1c gave a r^2 of 0.66, reflecting the expected strong link between these two measures and the impact of other factors. Applying this equation to HbA1c = 48 mmol/mol for the 720 women ≤50 years gave corresponding FG = 6.66 mmol/L. For the 987 men ≤50 years FG = 6.48. For the 2993 women >50 years FG = 6.59. For men >50 years FG = 6.74. This showed that for the same HbA1c, younger women had a 1.06% higher FG than older women and 2.78% higher FG than younger male peers.
Conclusion: We here provide additional evidence that there is a differential in the relation between circulating glucose level and HbA1c in younger women vs younger men with implications for diabetes diagnostic threshold.

P49 | The role of hyperglycaemia and obesity in lung health: A systematic review (2023)

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Aims: Type 2 diabetes has been associated with mild airway restriction, yet the prevalence of obstructive lung conditions is higher in the diabetes population. Obesity is a confounding factor and has been reported to be both protective and to enhance risk independent of hyperglycaemia. The aim of the study was to evaluate the role of hyperglycaemia and obesity on lung function parameters in people with chronic obstructive pulmonary disease (COPD) and asthma.
Methods: Ovid MEDLINE and Embase databases were methodically searched. 109 studies were included, with 60,155 total participants. Included studies had data on type 2 diabetes and/or obesity and forced expiratory volume in 1s (FEV1) and/or forced vital capacity (FVC). All studies were assessed for either quality (Newcastle–Ottawa scale) or risk of bias (Cochrane methodology). Combined means and standard deviations were used to synthesise data, and significance tested by Kruskal–Wallis.
Results: Those with type 2 diabetes without a lung disease had mild airway restriction in comparison with lean or obese individuals who did not have diabetes. However, outcomes for those with asthma and COPD in the presence of type 2 diabetes were comparable to those who had either condition in the absence of type 2 diabetes. We did not find an independent role for obesity in lung decline.
Conclusion: We conclude that in the absence of COPD and asthma, type 2 diabetes is independently associated with airway restriction and that early monitoring of lung function following a diabetes diagnosis may be warranted.

P50 | Health consequences of polycystic ovary syndrome (PCOS) by disease phenotype: An analysis of prospective cohort and multi-organ imaging data from the UK Biobank

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Refer to Oral number A58.

P51 | The healthier you: NHS Diabetes Prevention Programme and the incidence of type 2 diabetes in England

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Refer to Oral number A56.

Basic and clinical science posters: Foot

P52 | Hastening the *in vivo* repair of full thickness diabetic wounds in rats via employing novel designed multilayered bio-nanofibrous scaffolds

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Aims: Patients with diabetes are prone to develop ulcers that take a long time to heal, thus worsely influencing the patient's life. In this study, we sought to hasten cutaneous wound healing in streptozotocin-induced diabetic rats employing bio-nanofibrous scaffolds.
Methods: Electrospun bio-nanofibrous scaffolds were constructed followed by characterisation and cell viability screenings. Utilising both healthy and diabetic full-thickness skin lesion in rodents, the scaffolds were biweekly inserted following wound site photography for 14 days to calculate wound closure. On day 14, lesion beds were extracted for histological analysis.
Results: The bio-nanofibrous images showed dimension varied from 100 to 240 nanometres using scanning electron microscopy. The bio-nanofibers exhibited minimal cytotoxicity *in vitro*. On Day 14, scaffolds-treated diabetic lesions showed 99.98% closure percentage compared to 90.65% for untreated lesions, indicating a rapid healing. The histopathological examination showed a significant difference ($p < 0.05$) in collagen density between treated [237 ± 6.3 (98%)] and untreated [187 ± 19 (77%)] diabetic lesions.
Summary: The findings indicate the exceptional efficacy for the wound dressing bio-nanofibers scaffold.

P53 | Preliminary *in vitro* assessment of decellularised adipose tissue (DAT) as a regenerative material for diabetic foot ulcers

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Background and Aims: DAT implantation can provide a framework for the patient's cells to migrate, proliferate and regenerate, restoring normal biomechanical and biological function. To produce DAT and assess its ability as a long-term, preventative therapy for patients at-risk for developing diabetic foot ulcers.
Methods: Successful decellularisation was validated using biochemical assays and histology. Cellular adhesion, proliferation and migration within DAT were validated *in vitro* using live-dead imaging, histology, metabolic assays and immunohistochemistry. Once cytocompatibility was confirmed, the ability of DAT to promote differentiation was explored using BODIPY lipid staining and an adiponectin ELISA. *Ex-ovo* chorioallantoic membrane (CAM) assays were carried out to highlight angiogenic ability of DAT.
Results: Decellularisation was successful, with a reduction of ~99% of the lipid, <40 ng of DNA per mg of tissue remaining, and a reduction in detergent below cytotoxic levels. Cells adhered to the scaffold and remained alive after 4 weeks of culture, whereas time-course histological analysis over this period suggested that the cells migrated further into the DAT. Additionally, the cells remained metabolically active throughout the 4 weeks, and were actively proliferating at the 4-week end point. 3T3-L1 cells had begun to differentiate into adipocyte-like cells by week 4 of culture. Blood vessels displayed directional ingrowth toward the scaffold suggesting angiogenic capability.
Conclusions: This *in vitro* data suggest that DAT is a suitable biomaterial for adipose tissue regeneration for patients with DFUs, as the DAT encourages infiltration and growth of cells and is likely to increase vascularisation towards the implant.

Basic and clinical science posters: Genetics

P54 DUK | Genetically determined liver fat reveals a new insight into the association with type 2 diabetes, cardiovascular disease and cancer: A Mendelian randomisation study

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Aims: The aim of the study was to dissect the underlying mechanisms by which liver fat contributes to type 2 diabetes and its complications.
Method: We conducted a genome wide association study on 37,768 individuals from the UK Biobank to identify genetic variants associated with liver fat measured from MRI scans. We characterised each genetic variant's effects on lipids, BMI and pancreas fat to gain deeper mechanistic insights. We performed Mendelian randomisation analyses to investigate the causal relationships between elevated liver fat and health outcomes, including type 2 diabetes, different cardiovascular outcomes and liver cancer. We applied multivariable Mendelian randomisation to disentangle the influence of liver fat from that of BMI and lipids.
Results: We identified 13 independent genetic variants associated with liver fat. These variants fell into two main groups: those associated with impaired hepatic triglyceride export, where liver fat-increasing alleles were correlated with a reduced risk of coronary artery disease and myocardial infarction but an elevated risk of type 2 diabetes, and variants associated with enhanced hepatic triglyceride import, where liver fat-increasing alleles were linked to a higher risk of myocardial infarction and coronary artery disease. Genetically determined higher liver fat content was consistently associated with an increased risk of liver cirrhosis, fibrosis, intrahepatic cholangiocarcinoma, and liver and bile duct cancers, irrespective of the underlying mechanism and with a dose-dependent relationship.
Conclusions: Liver fat has a consistent effect on diabetes and liver outcomes but a heterogeneous effect on cardiovascular outcomes, which depends on the specific mechanisms that drive fat accumulation in the liver.

P55 | A missense variant in PIEZO1 may distort the relationship between glycated haemoglobin (HbA1c) and blood glucose in South Asians

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Refer to Oral number A30.

P56 DUK | Abstract withdrawn.

P57 DUK | Polymorphic secondary DNA structures in the regulatory promotor region of the insulin gene affect glucose responsiveness

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Aims: The regulatory promotor region of the insulin gene has a variable number of tandem repeat region known as the insulin-linked polymorphic region (ILPR). This DNA segment is cytosine-rich and can form a four-stranded i-Motif DNA structure while the complementary guanine-rich sequence may form a G-quadruplex. Human individuals have variations in the DNA sequence of the ILPR which can lead to structural changes in the polymorphic secondary DNA structure. So far, there is no clear relationship between the sequence diversity, the DNA structure formation and the functional effects on insulin gene expression.
Methods: We biophysically characterised the DNA structure formation and stability in 16 known ILPR variants. Seven selected ILPR variants are cloned into a reporter gene vector which are co-transfected with a reference vector into INS-1 cells, missing an intrinsic ILPR. Transfected cells are treated with 2.8 and 16.2 mM glucose and glucose responsiveness are assessed with the dual luciferase assay.

Results: Small variants in the nucleotide sequence were able to alter secondary DNA structure formation and stability. The dual luciferase assay revealed that variants capable of forming i-Motif and complementary G-quadruplexes respond to high glucose levels with increasing insulin expression. Furthermore, the altitude of glucose responsiveness depends on the structural stability of the i-Motif DNA.
Conclusions: Secondary DNA structures in the ILPR of the promotor region of the insulin gene regulate glucose response in cells. The importance of i-Motif DNA structure stability provides an alternative therapeutic target and potential for rational based drug design.

P58 | Partitioned polygenic and polyextreme scores provide insight into aetiology of type 2 diabetes and gestational diabetes (GDM) in British Pakistanis and Bangladeshis: Results from the Genes & Health study

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Aims: Type 2 diabetes disproportionately affects South Asian individuals, but genetic research on type 2 diabetes is concentrated in White Europeans. We explored the association between 12 recently derived multi-ancestry partitioned polygenic risk scores (pPS) for diabetes-related 'endotypes' such as lipodystrophy and beta cell dysfunction with type 2 diabetes and GDM in British South Asian individuals.
Methods: Using electronic health record and genetic data from British South Asians with type 2 diabetes ($n = 9771$) and GDM ($n = 1740$) in the Genes & Health study, we explored associations between pPS, type 2 diabetes and GDM using sex- and ancestry-adjusted multivariable regression and Cox proportional-hazards models. We defined pPS 'polyextreme' scores as the number of pPS top deciles an individual was a member of (range 0–12).
Results: A 'beta cell' pPS for insulin deficiency was most strongly associated with type 2 diabetes (odds ratio (OR) per standard deviation (SD) 1.46, 95% CI: 1.42–1.50), GDM (OR per SD 1.27, 95% CI: 1.20–1.34) and age of diagnosis of type 2 diabetes (beta per SD = −1.7 years, 95% CI: −1.5 to −1.9), followed by a 'lipodystrophy' pPS for unfavourable adiposity (beta per SD = −1.4 years, 95% CI: −1.1 to −1.6). pPS polyextreme score was associated with progression to insulin (HR per unit = 1.07, 95% CI 1.03–1.11).
Conclusions: In British South Asians, genetic predisposition to GDM mirrors that of type 2 diabetes, driven by variation associated with insulin deficiency and unfavourable adiposity. pPS polyextreme scores can identify individuals more likely to require insulin.
Acknowledgement: Genes & Health.

P59 DUK | Complex interplay of GLP1R coding variant effects on type 2 diabetes and depression: A multiphenotype approach

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Objectives: In this study, we investigate multi-phenotype association between GLP1R coding variants and metabolic and psychiatric health traits and outcomes, two sets of conditions imposing a considerable burden on global healthcare systems. The bidirectional link between type 2 diabetes and depression, contributing to adverse microvascular and macrovascular outcomes, is a focal point of epidemiological research.
Methods: Leveraging phenotypic data from the UK Biobank, including whole exome sequencing for 467,836 individuals, we concentrated on the *GLP1R* gene and its 200kb flanking region (3487 coding variants). Analysing six key phenotypes, available in 70,001 UK Biobank individuals, including random glucose, HbA1c, body mass index (BMI), type 2 diabetes, major depressive disorder and depressive symptoms, adjusted for demographic confounders, we employed SCOPA software, using a reverse regression approach for multi-phenotype analysis.
Results: Our meticulous approach revealed significance in multi-phenotype associations for 19 variants. Notably, a rare *GLP1R* gene variant (6:39073639:G:A) exhibited significant associations with both glucose metabolism and depression ($p = 4.28 \times 10^{-9}$). Furthermore, a previously reported rare variant linked to random glucose demonstrated significance in the model with metabolic phenotypes ($p = 0.026$).
Conclusion: These findings provide support for shared mechanisms in the development of type 2 diabetes and depression, providing insights for targeted interventions and personalised treatment strategies.

P60 | Multi-phenotype (MP) genome-wide association studies (GWAS) uncovers shared genetic loci between type 2 diabetes, BMI, colorectal, pancreatic, breast and prostate cancers

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Introduction: There are established relationships between type 2 diabetes and cancer. In fact, cancer is the most common cause of death patients. We aimed to elucidate the pathophysiological processes shared between type 2 diabetes, BMI and four cancers through MP GWAS.
Methods: We combined GWAS on 36,173 individuals from the European Prospective Investigation into Cancer, including 10,855 type 2 diabetes, 4126 postmenopausal breast, 2111 colorectal, 473 pancreatic and 419 prostate cancer cases with pooled controls from all disease cohorts, imputed against the Haplotype Reference Consortium reference panel. We performed MPGWAS using the reverse regression approach as is implemented in the SCOPA software. For the top loci we evaluated the phenotype combinations driving the associations using Bayesian Information Criterion (BIC).
Results: Within MPGWAS, we identified 193 association signals ($p < 5 \times 10^{-8}$) either for type 2 diabetes-cancers or BMI-cancers models. Out of the 24 signals which were established for at least one of the included phenotypes, we classified *DND1P1* (for BC + type 2 diabetes) and *PTHLH* (five disease model, four disease and BMI model) as multi-phenotype loci, contributing to disease comorbidity. Of the remainder, we re-classified 17 established loci, with primary effects on either on type 2 diabetes, BMI and four cancer individual outcomes.
Conclusions: Through the improved power via implementation of MPGWAS we highlighted a clear contribution of *DND1P1* explaining multi-phenotype effects underlying co-occurrence of breast cancer and diabetes and *PTHLH* effecting five diseases in addition to BMI.
Funding: WCRF-2017/1641, DIABETESUK 20/0006307, LONGITOOLS H2020-SCI-2019-874739.

P61 | Mendelian randomisation analysis does not provide evidence for relationship with recurrent pregnancy loss or recurrent miscarriage

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Aims: In the intricate realm of reproductive health epidemiology, the interplay between diabetes and miscarriage takes centre stage. Pregnancy loss (PL) is a frequently occurring human infertility-related condition affecting ~0.8% to 1.4% of women in the general population. The causal factor for PL leading to treatment is usually identified in ~50% of patients only. Exploring potential shared underlying mechanisms, we tested a hypothesis about metabolic pathways contributing to PL susceptibility and causality between type 2 diabetes gestational diabetes (GDM) and PL. By scrutinising large-scale studies and synthesising diverse findings we aimed to investigate whether recurrent pregnancy loss shares biological pathways with type 2 diabetes/GDM.
Method: Using the LUCAR study (Lviv Ukrainian Cohort for Advancing Reproductive Health) from the Western Ukraine and UK Biobank (UKBB) data sets we performed a two-sample Mendelian randomisation (MR) analysis. For type 2 diabetes/GDM, exposure phenotypes, we used the summary statistics from genome-wide association studies: PMID: 32541925, 28566273, 35220425. As outcome, we used two PL data sets: LUCAR, which includes 273 idiopathic RPL cases and 535 controls with at least one healthy child, all having the genome-wide association study (GWAS) data imputed to TopMED, and UKBB, consisting of 12,414 women with recurrent miscarriage (RM) and 117,341 control women with at least one (self-reported) healthy-born child.
Conclusions: The MR analyses results using established lead type 2 diabetes/GDM SNPs as instruments did not rich statistical significance ($p > 0.05$/$p > 0.05$ respectively).
Discussion: Despite the previous epidemiological evidence of pregnancy loss relationship with diabetes types, we did not detect causal relationship in the LUCAR from Western Ukraine and UK Biobank studies.

P62 DUK | Longitudinal change in adiposity: From relationships with psychiatric traits to effects on insulin secretion

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Objective: Longitudinal studies reveal that weight gain and increased adiposity over time are associated with a higher risk of type 2 diabetes due to the development of insulin resistance.
Methods: We performed genome-wide association study (GWAS) of longitudinal changes at adiposity from childhood to adulthood using body mass index (BMI) and comparative body size at age 10 measurements. We implemented linear mixed-model in BOLT-LMM v2.3 for 280,402 European ancestry individuals from UK Biobank with both measures.
Results: We identified 111 independent signals associated with the longitudinal change in body size, thereafter tree quarters (84 signals) of them overlapped with established (e.g. *FTO*, *SEC16B*, *ADCY3*, *TMEM18*, *LINC01875*, *TNNI3K*, *MC4R*, *GPRC5B*, *GPR139*, *RPL31P12*, *MAP2K5*) adulthood BMI or waist-hip ratio adjusted for BMI loci. Moreover, 18/22 loci are established for both BMI and comparative body size at age 10/comparative body size at age 10 only. Importantly, two coding variant and two intergenic signals (*NEGR1*, *RNU6-334P/NIHCOLE*, *TMPOP1/MICC*, *RIT*) overlapped with intelligence (PMID: 29326435), education attainment (PMID: 30038396) and depressive symptoms associations (PMID: 29292387). Coding variant rs78444298 in *EDEM3* is also associated with random glucose. We identified five novel loci (*LINC02238*, *RFPL4AP3*, *PCLO*, *RASA4*, *METTL15*), established for educational attainment, bipolar or major depressive disorder, latter two with moderate effect on type 2 diabetes risk. The novel signal in *PCLO* gene, involved in insulin signalling pathway and response to GLP-1 agonists, also affects risk of schizophrenia and major depressive disorder.
Conclusion: Our investigation brings novel insights for potential pathophysiological relationships between longitudinal change in BMI, risk of type 2 diabetes and psychiatric outcomes, such as depression.

Basic and clinical science posters: Hypoglycaemia

P63 CS | Association between continuous glucose monitoring (CGM) and duration of hypoglycaemia at two levels of hypoglycaemia: The Hypo-METRICS study

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Aim: CGM has been shown to reduce sensor-detected hypoglycaemia (SDH) within individuals. Using data from Hypo-METRICS, we explored differences in duration of SDH in CGM vs non-CGM users, with type 1 and insulin-treated type 2 diabetes.
Method: Participants with type 1 diabetes and type 2 diabetes, with ≥1 hypoglycaemic episodes over 3 months, continued their usual glucose monitoring and prospectively wore blinded CGM, monitoring real-time hypoglycaemia on a smartphone app for 10 weeks. SDH was defined as per Advanced Technologies and Treatments for Diabetes (ATTD) consensus.
Results: 597 (type 1 diabetes = 276 and type 2 diabetes = 321) people were recruited; median age 47 vs 63 years, median HbA1c 51 vs 54 mmol/mol. There were 340 CGM (76% type 1 diabetes) users and 257 non-users.
Median (IQR) duration of SDH < 3.9 mmol/L was significantly shorter in CGM users vs non-users: 58 (45–71) min vs 67 (54–82) min type 1 diabetes, p-value = 0.003; 53 (41–59) min vs 65 (45–86) min type 2 diabetes, p-value = 0.01.
Median duration of SDH < 3 mmol/L was not significantly different in CGM users vs non-users: 36 (28–48) min vs 41 (28–58) min type 1 diabetes, p-value = 0.15; 38 (27–56) min vs 65 (44–86) min type 2 diabetes, p-value = 0.55.
Conclusion: CGM was associated with reduced duration of SDH < 3.9 mmol/L, but not SDH < 3 mmol/L, in both type 1 diabetes and type 2 diabetes populations. The statistical difference in duration between the two levels of SDH may reflect the clinical usefulness of CGM in treating hypoglycaemia earlier, with people spending less time below range. It could also be explained by the small SDH < 3 mmol/L sample; future research may elucidate this.
Acknowledgement: Hypo-RESOLVE Consortium.

P64 DUK | Pharmacological amp-activated protein kinase (AMPK) activation suppresses low glucose-dependent macrophage migration inhibitor factor (MIF) release from macrophages

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Aims: Acute hypoglycaemia promotes pro-inflammatory cytokine production, increasing risk for cardiovascular events in diabetes. AMPK is regulated by and influences production of pro-inflammatory cytokines. We tested the mechanistic role of AMPK in low glucose induced changes in the pro-inflammatory cytokine MIF, which is elevated in people with diabetes.

Methods: Raw264.7 macrophage cells, primary macrophage bone marrow-derived macrophages from wild-type mice or AMPK γ1 gain-of-function mice were used, as were AMPKα1/α2 knockout mouse embryonic fibroblasts (MEF). Allosteric AMPK activators PF-06409577 and BI-9774, in conjunction with inhibitor SBI-0206965 were used. Changes in protein phosphorylation/expression were examined using western blotting and protein localisation using immunofluorescence. Metabolic function was assessed using extracellular flux analyses and luciferase-based ATP assay. Cytokine release was quantified by ELISA. Oxidative stress was detected using a fluorescence-based assay. Cell viability was examined using flow cytometry.

Results: Macrophages exposed to low glucose showed a transient and modest activation of AMPK and a metabolic shift towards increased oxidative phosphorylation. Low glucose induced oxidative stress and increased release of MIF. Activation of AMPK by PF-06409577 and BI-9774 attenuated low glucose-induced MIF release, with a similar trend noted with genetic activation using AMPKγ1 gain-of-function (D316A) mice. Inhibition of NFKB signalling diminished MIF release and AMPK activation modestly but significantly reduced low glucose-induced nuclear translocation of NFκB. AMPK activation did not alter low glucose-induced oxidative stress in macrophages.

Conclusions: These data suggest that pharmacological AMPK activation could be a useful strategy for mitigating hypoglycaemia-induced inflammation.

P65 CS | Evaluating heart rate responses to asymptomatic hypoglycaemia in the hypoMETRICS study

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Background: Hypoglycaemia can lead to a sympathetic response and changes in heart rate. However, many episodes of nocturnal sensor detected hypoglycaemia (SDH) are asymptomatic.

Objective: The objective of the study was to explore the heart rate response to asymptomatic SDH in the HypoMETRICS study.

Methods: Data from 245 individuals with type 1 diabetes were analysed. Participants wore blinded Freestyle Libre 2 for 10 weeks and SDH was determined as a glucose value less than 3.0 mmol/L for 15min or more. Heart rate and activity data were derived from Fitbit Charge 4 and participants reported whether episodes were symptomatic or asymptomatic using a bespoke mobile application. We compared heart rate at rest with heart rate during hypoglycaemia, also at rest.

Results: Nocturnal as well as daytime asymptomatic episodes of SDH were associated with lower heart rate (nocturnal = 66 vs 75bpm, $p < 0.001$, day time = 74 vs 81bpm, $p < 0.001$).

Conclusions: Asymptomatic SDH is associated with reductions in heart rate which may reflect imbalance between sympathetic and parasympathetic activity.

Basic and clinical science posters: Immunology/autoimmunity

P66 BS | Identification of a novel population of T-bet expressing regulatory T cells in obesity

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Aims: Obesity is associated with alterations in immune cells within adipose tissue (AT), including regulatory T cells (Tregs). Global deletion of the immune cell transcription factor T-bet improves insulin sensitivity in mice but the subpopulation responsible for this phenotype is unknown. We hypothesised that T-bet is expressed in AT-Tregs and that this impacts obesity and glucose homeostasis.

Methods: We developed a murine model ($T\text{-}bet^{FM}$) allowing T-bet-expressing cells to be tracked by flow cytometry. Treg-specific T-bet deficient mice ($Treg^{\Delta T\text{-}bet}$) were established and fed either a chow or high-fat diet (HFD). Body weight, food intake and glucose homeostasis were monitored. Key thermogenic genes were measured using RT-qPCR in the white adipose tissue (WAT) from $Treg^{\Delta T\text{-}bet}$ mice.

Results: We identified a T-bet positive Treg population, highly enriched in AT. Compared with controls, $Treg^{\Delta T\text{-}bet}$ mice were completely protected from HFD-induced obesity (final body weight: 29.9 ± 3.9 vs 37.3 ± 1.7g; $p < 0.0001$) with improved insulin sensitivity (AUC: 7202 ± 596 vs 8362 ± 394; $p < 0.0001$) and glucose tolerance (AUC: T 1555 ± 93 vs 1926 ± 88; $p < 0.0001$), despite exhibiting a similar food intake. Mechanistically, uncoupling protein 1 (UCP-1) and related thermogenic genes were upregulated within the WAT of $Treg^{\Delta T\text{-}bet}$ mice ($2^{-\Delta CT}$ of UCP-1: 0.0021 ± 0.0013 vs 0.000049 ± 0.0000008; $p < 0.05$).

Summary: This study reveals a previously unrecognised group of T-bet expressing Tregs that play a critical role in the pathophysiological reaction to an HFD in mice, potentially impacting WAT browning.

Basic and clinical science posters: Insulin: Actions, metabolism and therapy

P67 | The insulin paradox: Higher total daily doses of insulin are associated with higher, not lower, average daily glucose levels

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Aims: There is a large variation in the daily insulin dose for people with type 1 diabetes. While some of this variation can be explained by health behaviour differences, biological differences also have a role in determining the insulin required to maintain normoglycaemia. We aimed to the relationship between daily insulin dose and average glucose levels.

Methods: We used data from the Type 1 diabetes EXercise Initiative (T1DEXI) cohort, in which 329 US adults with type 1 diabetes using insulin pumps recorded a complete range of variables for 28 consecutive days. We analysed continuous glucose monitoring (CGM) and insulin dosage combined with exercise and nutritional data.

Results: The total daily dose of insulin varied between participants (mean 0.6 ± 0.2 units per kg), which was partially explained by age, body mass index (BMI), mode of insulin delivery (pump vs hybrid closed loop, HCL) and carbohydrate intake. HCL users took more insulin and spent more time within range than those using standard pumps ($79 \pm 11\%$ vs $73 \pm 4\%$, $p < 0.001$). However, after adjusting for these variables, we found a positive correlation between total daily insulin doses and average glucose levels ($r = 0.29$, $p < 0.001$).

Conclusions: Paradoxically, people with type 1 diabetes who take larger daily doses of insulin often experience higher blood glucose than those who take smaller daily doses, even after correction for a range of variables.

P68 | Extracts of *Vernonia amygdalina* stimulated non-toxic insulin secretion from clonal pancreatic cells and improved glucose tolerance in mice with diet-induced type 2 diabetes

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Aim: *Vernonia amygdalina* extract is used traditionally for type 2 diabetes treatment in developing countries, but mechanisms underlying its actions are poorly understood. This study investigates insulin releasing effects of *V. amygdalina* extracts.
Methods: Insulin-releasing and cytotoxic effects of *V. amygdalina* extract (0–1000 μg/mL) were investigated using BRIN-BD11 cells. Mechanisms of actions, effects of plant extract on intracellular calcium concentration and its effects on mice with diet-induced type 2 diabetes were also assessed.
Results: The presence of tannin, phlobatannin, alkaloids, cardiac glycosides and terpenoids was observed. Total flavonoid and total phenolic contents were 0.24QE/g and 0.49GE/g respectively. The extract stimulated dose-dependent insulin secretion at ≥0.1 μg/mL (1.4 to 2.5-fold, $p < 0.001$). Cytotoxicity or impaired cell viability were not observed. Insulin-release increase with increasing glucose concentration (1.1 to 5.6 mM, 10%, $p < 0.05$, and 5.6 to 16.7 mM, 13%, $p < 0.05$). These effects were reduced in the presence of diazoxide (300 μM, 46%, $p < 0.01$), verapamil (50 nM, 34%, $p < 0.01$) and in the absence of extracellular calcium (20%, $p < 0.05$). Enhanced insulin secretion was observed in incubations containing KCl (30 mM, 3.0-fold, $p < 0.001$) and IBMX (200 μM, 1.9-fold, $p < 0.01$). The extracts enhanced intracellular calcium concentration by 24% ($p < 0.01$). Glucose tolerance and insulin secretion also improved by 23% ($p < 0.01$) and 34% ($p < 0.01$), respectively, in diet-induced mice treated with the extract.
Conclusion: These results suggest that the anti-diabetic properties of *V. amygdalina* extract may involve the activation of the ATP-dependent pathway of insulin secretion. These results encourage further investigations of the anti-diabetic actions of *V. amygdalina* extracts.

Basic and clinical science posters: Insulinotropic agents and enteroinsular hormones

P69 | Investigations of cellular uptake and anti-diabetic actions of (dAla2)-GIP-conjugated tigerinin-1R

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Aim: Previous reports indicate the therapeutic potential of tigerinin-1R, isolated from the skin secretions of *Hoplobatrachus rugulosus*, as an antidiabetic agent. This study investigates the impact of conjugation of tigerinin-1R with (dAla2)-GIP on the cellular uptake and anti-diabetic actions of the peptide.
Method: Changes in the chemical properties of (dAla2)-GIP conjugated tigerinin-1R and its insulinotropic effects (0–3 μM) were assessed. Cellular uptake, cytotoxicity, mechanism of actions and glucose tolerance in high-fat fed mice were assessed.
Result: The conjugation of tigerinin-1R with (dAla2) GIP reduced its net charge (+1 to −1.9) and the theoretical pI (8.3 to 4.4). No significant change in amphipathicity was observed. G-TGN stimulated non-toxic insulin secretion at concentrations ≥10 nM ($p < 0.05$ to $p < 0.001$). Effect of G-TGN was higher compared to tigerinin-1R (1.5-fold, $p < 0.01$) and GIP (1.3-fold, $p < 0.05$). No effect on cell viability and erythrocyte haemolysis was observed. Effects of G-TGN increased with glucose concentration (1.1 to 5.6 mM, 1.3-fold, $p < 0.05$ and 5.6 to 16.7 mM, 1.7-fold, $p < 0.01$) and in the presence of KCl (30 mM, 3.6-fold, $p < 0.001$) and tolbutamide (200 μM, 2.4-fold, $p < 0.01$). Verapamil (50 nM, 23%, $p < 0.05$), diazoxide (300 μM, 27%, $p < 0.05$) and removal of extracellular calcium (19%, $p < 0.05$) inhibited actions of G-TGN. G-TGN enhanced intracellular calcium (23%, $p < 0.01$) and increased membrane depolarisation (19%, $p < 0.05$). Improvement in glucose tolerance in mice receiving G-TGN was higher compared with tigerinin-1R (19%, $p < 0.05$) and GIP (13%, $p < 0.05$). Cellular uptake of G-TGN increased by 3.6-fold compared with tigerinin-1R.
Conclusion: The conjugation of (dAla2) GIP with tigerinin-1R significantly enhanced its potential and encourages its development as a novel anti-diabetic drug.

Basic and clinical science posters: Lipids and fatty liver

P70 | The use of non-invasive tests for clinically significant hepatic fibrosis associated with non-alcoholic fatty liver disease (NAFLD) in people with type 2 diabetes

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Aims: Debate continues around screening for NAFLD in people with high risk. We aimed to determine the accuracy of non-invasive tests for NAFLD-fibrosis in people with type 2 diabetes.
Method: A retrospective study included patients with NAFLD on liver biopsy between November 2011–September 2022. The AST:ALT ratio, fibrosis-4 score, NAFLD fibrosis score (NFS), AST-to-platelet ratio index (APRI) and fibroscan–liver stiffness measure (LSM) were determined. Their accuracy to predict clinically significant fibrosis (fibrosis stage 2–4) were determined by area under the receiver operating characteristic (AUROC) and compared between people with or without type 2 diabetes.
Results: 153 patients with NAFLD were included, with a mean age 54.0 ± 11.5 years, 80 (52.3%) were male, 73 (47.7%) had pre-existing type 2 diabetes. Overall, the fibrosis-4 score demonstrated the greatest AUROC for clinically significant fibrosis (0.834 [0.752–0.916], $p < 0.001$). In people with type 2 diabetes, there was greater AUROC with the fibrosis-4 score (0.891 [0.795–0.987] vs 0.813 [0.701–0.925]), TE-LSM (0.785 [0.641–0.929] vs 0.721 [0.586–0.857]), and AST:ALT ratio (0.771 [0.612–0.930] vs 0.575 [0.420–0.730]) compared to people living without type 2 diabetes. Similarly, Youden's index was greater for the fibrosis-4 score (0.716 vs 0.517), TE-LSM (0.578 vs 0.390) and AST:ALT ratio (0.570 vs 0.246) in people with type 2 diabetes, suggesting greater screening test utility. Diagnostic value improved further with sequential use of fibrosis-4 index and fibroscan-LSM.
Conclusions: Several blood-based tests for clinically significant NAFLD-fibrosis have good accuracy to detect clinically significant hepatic fibrosis in people with type 2 diabetes, improved further with sequential use of fibroscan. Non-invasive screening for NAFLD-fibrosis should be considered in people with type 2 diabetes.

P71 | *De novo* lipogenesis is the major metabolic signature associated with development/remission of type 2 diabetes in the NONcNZO10/LTJ polygenic mouse model

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Aims: Remission of type 2 diabetes can be achieved through directed weight loss, but the underlying molecular mechanism(s) are unknown. We hypothesised that hepatic *de novo* lipogenesis (DNL) is a critical and reversible mechanism underpinning remission.
Methods: We have previously optimised nutritional conditions for a 'human-like' polygenic type 2 diabetes mouse strain (NONcNZO10/LtJ) and here aimed to mimic the process of type 2 diabetes remission and associated changes in DNL. 12 male mice at 5–6 weeks of age were placed on high sucrose diet for 12 weeks, then weight loss was induced through calorie restriction (70% of normal intake) for 12 weeks. The diet was enriched with deuterated water and C-labelled palmitic acid for measuring DNL and tracing dietary fatty acids respectively. Fat and lean mass were determined by TD NMR, and glucose tolerance testing was carried out by oral gavage (OGTT) at baseline, 12 and 24 weeks. Stable isotopes were analysed by high resolution LC–MS.
Results: After 12 weeks, mice on high sucrose diet gained body weight (>20%) and exhibited a two-fold increase in total fat mass (4.5% to 10.4%). This was accompanied with elevated liver fat, impaired glucose tolerance and initiation of beta cell failure evidenced by reduced insulin across the glucose tolerance compared with baseline. Calorie restriction caused ~14% loss of body weight, decreased fat mass and exhibited normalisation of glucose intolerance. Total plasma and liver DNL increased substantially at 12 weeks followed by a marked decrease after calorie restriction (>10%).
Conclusion: Sucrose/calorie-restriction in NONcNZO10/LtJ are a validated model for type 2 diabetes remission. DNL is a primary pathway that could be targeted to prevent/reverse type 2 diabetes.
Acknowledgement: Al-Mrabeh's group.

Basic and clinical science posters: Maturity onset diabetes of the young (MODY)

P72 | New maturity onset diabetes of the young (MODY) calculator 2: Higher accuracy and now with biomarkers

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Refer to Oral number A32.

P73 DUK | Clinical utility of maturity onset diabetes of the young (MODY) genetic testing in people with diabetes diagnosed after 40 years: An analysis of >56,000 individuals with older-onset diabetes

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Refer to Oral number A50.

Basic and clinical science posters: Molecular basis for the treatment of complications

P74 | Application of novel topical gel loaded with AP39, a hydrogen sulphide (H2S) donor, improves cellular wound healing and reduces inflammation associated with impaired wound healing in hyperglycaemic environments

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Aims: Diabetic foot ulcers affect up to 100,000 patients each year in the UK costing the NHS £1Billion annually. Chronic inflammation and poor circulation associated with diabetic wounds leads to compromised tissue repair, infection and increased amputation risk. H2S is a modulator of both angiogenesis and re-epithelialisation necessary for healthy wound healing. We explored if a gel loaded with AP39, a H2S-donor, would aid healing of a diabetic wound model.
Methods: Hydroxypropyl-methylcellulose gels (5%w/v) were prepared with 5%v/v propylene glycol and 0.005%w/w AP39. Formulation was characterised with a texture analyser and HPLC-UV. HUVEC viability following AP39 exposure was determined followed by cellular uptake. AP39 potential to modulate pro-inflammatory response in HUVECs cultured in a hyperglycaemic environment, mediated by TNF-α, by measuring levels of IL-6 in culture-media by ELISA was investigated. Tube formation and wound healing assays were performed over 24h as indicative of angiogenesis.
Results: HUVECs exposed to 500 nmol AP39 over 24h were viable; furthermore, 60% cellular uptake was observed. HUVECs exposed to TNF-α(3h) showed increased IL-6 compared to non-treated cells (65.67 ± 6.66 pg/mL vs 16.40 ± 4.16 pg/mL) ($p < 0.001$). AP39 gel abrogated cellular IL-6 exposed to TNF-α to 40.88 ± 4.67 pg/mL ($p < 0.0001$). HUVECs treated with TNF-α then incubated with AP39 gel increased tube formation compared with controls (3428 ± 559 μM to 6766 ± 391 μM) ($p < 0.01$). Finally, wound closure in HUVECs exposed to TNF-α followed by AP39 formulation increased compared with non-treated cells, from $36.72 \pm 3.88\%$ to $65.05 \pm 3.54\%$ ($p < 0.001$).
Conclusions: Observations show gels prepared with the H2S-donor AP39 are non-toxic to HUVECs, reduce inflammation and improve angiogenesis with the potential to facilitate diabetic wound healing.

Basic and clinical science posters: Nephropathy

P75 | Abstract withdrawn.

Basic and clinical science posters: Neuropathy

P76 | Structural brain alterations associated with long-term opioid treatment in Painful-diabetic peripheral neuropathy (DPN)

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Aims: Opioid medications are commonly used to treat Painful-DPN. However, the impact of opioids on the brain in Painful-DPN have not been explored. We performed a study to determine the effect of long-term opioid treatment (>6 months) on brain structure in Painful-DPN.
Methods: Fifty-six participants with Painful-DPN (17 on long-term opioid treatment [O+] and 39 not on opioid treatment [O−]) and 25 without DPN (No-DPN) were recruited. Participants underwent detailed clinical and neurophysiological assessments and cerebral imaging (3T, Phillips Medical Systems, Holland). Global and regional morphometric analysis was performed using Free surfer (https://surfer.nmr.mgh.harvard.edu/). FSL-FIRST (https://fsl.fmrib.ox.ac.uk/fsl/fslwiki) analysis examined subcortical structural differences.
Results: O+ participants were prescribed the following: codeine ($n=3$, 18%), tramadol ($n=5$, 29%), morphine modified release ($n=1$, 6%), buprenorphine ($n=1$, 6%) and combination treatment ($n=5$, 29%). O+ participants had a longer duration of diabetes, greater HbA1c and higher pain severity compared with the O− group. Participants in the O+ group had a greater mean caudate volume (O+ 3.5 mL ± 0.4; O− 3.2 ± 0.4 mL, $p=0.034$) and mean insula volume (O+ 6.3 ± 0.8; O− 5.9 ± 0.6, $p=0.049$). Caudate volume differences (O+ > O−) were confirmed using FSL-FIRST.
Summary: This is the first study to examine the impact of opioids on cerebral structure in Painful-DPN. We demonstrated alterations in insular cortical and caudate morphology. Thus, opioids may alter affective/attentional pain processing (insular cortex) and brain regions associated with binge/intoxication (caudate nucleus). These results may have important clinical implications for uncovering the effects of long-term prescription opioid use on the brain in Painful-DPN.

P77 DUK | Hypoxia is functionally significant in activation of dorsal horn neurons in the maintenance and permanence of type 2 diabetic neuropathic pain

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Aims: Our research has demonstrated that diabetic neuropathic pain manifests due to a reduced spinal cord blood perfusion. Loss of vascular support results in dorsal horn neurons becoming hypoxic. This study aims to identify a hypoxia responsive sensory neuronal ensemble, which is fundamental to diabetic neuropathic pain manifestation.
Methods: All studies were authorised by local institutional ethical review and under Home Office ASPA legislation. Tamoxifen inducible R26-O2CreER(T2) (67177-JAX) mice were intravenously injected via tail vein with AAV, PHP.eb syn DIO HM4DimCherry (Addgene #44362) and left 2 weeks. Mice were given either experimental diet (high fat (60% cal fat)) or intrathecal injection of hypoxia mimetic, dimethyloaxallyl glycine (DMOG). Animals body weight, blood glucose and nociceptive behavioural withdrawals were tested. Paraformaldehyde fixed lumbar spinal cords were extracted and processed (40 μM thick sections) for confocal microscopy.
Results: Intrathecal DMOG treatment and high fat diet led to an induction of neuropathic pain behavioural phenotypes when compared to normal chow fed or vehicle treated mice. Lumbar spinal cord cryosections demonstrated increased abundance of hypoxia responsive neurons (mCherry positive) in DMOG and high fat fed mice when compared to lean or vehicle controls. Following intraperitoneal injection of Clozapine N-oxide (CNO) mice, DMOG and high fat diet induced pain hypersensitivity was prevented.
Conclusions: These findings shed light on the hypoxia mediated mechanisms underlying diabetic neuropathic pain.

P78 | Increased vasculature on thigh skin biopsy differentiates Painful from Painless-diabetic peripheral neuropathy (DPN)

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Aims: Painful-DPN is a common complication of diabetes, but its underlying mechanisms are poorly understood. Distal leg intra-epidermal nerve fibre density (IENFD) is not different between Painful- and Painless-DPN; however, calf skin vasculature has previously been shown to be increased in Painful-DPN. We performed skin biopsy at the upper thigh to examine the relationship between vascular and neural biomarkers and neuropathic pain in DPN.
Methods: Forty-one participants (13 Healthy Volunteers; 28 with type 2 diabetes [15 Painful-DPN, 7 Painless-DPN, and 6 without neuropathy, No-DPN]) were recruited. All participants underwent detailed clinical and neurophysiological testing, including calculation of the neuropathy composite score (NIS(LL)+7), calculated from results of 7 neurophysiological tests and neurological examination, and skin biopsy at the proximal thigh. Immunohistochemistry was performed to quantify IENFD with protein gene product 9.5 and blood vessels with von Willebrand Factor (vWF).
Results: The vWF immunoreactivity was significantly higher in Painful-DPN compared with all other study groups (vs HV, $p<0.001$; vs No-DPN, $p=0.005$; vs Painless-DPN, $p=0.001$). The PGP IENFD:vWF ratio was lowest in Painful-DPN compared with all other groups too (vs HV, $p<0.001$; vs No-DPN, $p<0.001$; vs Painless-DPN, $p=0.05$). Moreover, vWF correlated with severity of neuropathic pain (Visual Analogue Score, r 0.585, $p=0.005$) and objective measures of neuropathy, including NIS(LL)+7, cold and warm detection threshold, and IENFD.
Summary: This study demonstrates that dermal vasculature is increased in thigh skin and its ratio to IENF differentiates Painful- from Painless-DPN. Thus, dermal vasculopathy may be involved in the peripheral mechanisms of Painful-DPN.

Basic and clinical science posters: Other

P79 | Refining mouse glucose tolerance testing using micropipette-guided oral glucose dosing

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Background: Due to its multi-systemic nature, an intact animal must be used as an experimental model for some aspects of metabolic physiology, and rodents share key gastrointestinal and endocrine features with humans. The oral glucose tolerance test (oGTT) in rodent metabolic phenotyping typically utilises gavage for the glucose bolus, which can be technically challenging. A common alternative is the intraperitoneal GTT, with the glucose bolus delivered by intraperitoneal injection. This bypasses the gastrointestinal tract and is therefore less reflective of the human clinical assay. Both gavage and intraperitoneal glucose administration methods bypass the cephalic glucose-sensing via the mouth and can cause stress, a confounding variable.
Aims: We sought to develop a mouse oGTT protocol which is refined for both animal experience and physiological/clinical relevance, where the oral glucose bolus is administered via a simple, non-invasive micropipette-guided dosing (MDA) method.
Methods: Mice *(C57BL/6J* and *C57BL/6N)* were habituated to voluntarily drink a flavoured glucose solution via pipette without restraint, prior to oGTTs involving either MDA or gavage. Handling-only controls were included. Corticosterone and insulin were measured from terminal plasma taken 10 min after glucose dose (MDA or gavage) or handling-only control.
Results: MDA-oGTT produced a glucose excursion and a clearance profile matching that of the gavage oGTT in mice, though produced a lower overall glucose excursion in 6J mice. Plasma insulin was higher in male mice of both sub-strains. Plasma insulin was significantly increased in MDA-glucose vs handling controls in female 6J mice and in gavage vs MDA-glucose in female 6N mice. Preliminary corticosterone data has shown that MDA is not more stressful than handling alone.
Conclusion: The MDA method for glucose dosing may be a viable alternative to gavage in the mouse oGTT.

P80 | Oral anti-hyperglycaemic therapies are effective in people with diabetes secondary to pancreatic disease, but pancreatic exocrine insufficiency is a key determinant of treatment outcomes

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Refer to Oral number A31.

P81 | Hypo- and hyperglycaemia following pancreas transplant for people with type 1 diabetes

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Aims: The aim of the study was to establish the rates of and variables associated with glycaemic disturbances following pancreas transplant for people with type 1 diabetes and to quantify the association with graft failure.
Methods: All pancreas transplant recipients at University Hospital Wales from January 2013 to April 2019 with glucose tolerance test (GTT) data available were included in the study. Glycaemic disturbance was defined as an abnormal GTT or self-reported symptoms of hypoglycaemia.
Results: Of the 96 patients in this study, 30% developed a glycaemic disturbance. Hyperglycaemia was twice as common as hypoglycaemia (21.9% vs 10.4%). Recipients who developed hypoglycaemia were predominantly female (male: female ratio 1:7), had a lower body mass index (23.7 vs 27.6) and a higher pre-transplant HbA1c compared to recipients with hyperglycaemia. Post-transplant HbA1c levels were higher in individuals with hyperglycaemia (42 and 34 mmol/mol respectively). There was no increase in graft failure for recipients who experienced glycaemic disturbances (normoglycaemia 12%, hypoglycaemia 10%, hyperglycaemia 4.8%).
Summary: Glycaemic disturbances are common following transplantation. Recipients with hypoglycaemia were more likely to be female and of low body weight, which may be due to disordered eating with restricted calorie or carbohydrate intake. Recipients with hyperglycaemia had features of insulin resistance and type 2 diabetes with increased weight and male predominance. Glycaemic disturbance was not associated with graft failure suggesting it relates to insulin-glucose mismatch rather than rejection. Understanding predictive features can guide identification of high-risk individuals and the development of targeted interventions. Further follow-up is required to identify the long-term sequalae of glycaemic disturbance after pancreas transplants.

P82 | Misclassification matters: Individuals with misclassified type 1 diabetes can be identified in UK primary care data and are at increased risk of hypoglycaemia and diabetic ketoacidosis (DKA)

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Refer to Oral number A51.

P83 | The association between sitting accumulation and markers of cardiometabolic health in individuals at high risk of type 2 diabetes

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Aim: The aim of the study was to examine associations between accelerometer-assessed sitting time accumulation and cardiometabolic health in an ethnically diverse population at high risk of type 2 diabetes.
Methods: This analysis used baseline data from the PROPELS trial which recruited a multi-ethnic population with non-diabetic hyperglycaemia. Patterns of daily sitting time were captured using the activPAL accelerometer and calculated using three metrics: gini (lower value = more interrupted sitting pattern), alpha (lower value = frequent long sitting bouts with few short bouts) and usual bout duration (UBD; the *bout duration* above which half of all sitting *time* is accumulated. Lower value = sitting time accumulated in shorter bouts). Multiple linear regression

examined associations between the three sitting pattern metrics and cardiometabolic markers (HbA1c, total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, triglycerides, blood pressure, waist circumference (WC) and body mass index (BMI)).

Results: 1008 participants (mean age: 59.28 years (SD ± 9.16); 49.9% female; 70.1% White European) were included. After adjustment for confounders, significant associations ($p < 0.05$) were found between all three sitting pattern metrics (gini index, alpha, and UBD) and HDL, WC, and BMI. Alpha and UBD were also significantly associated with triglycerides. No associations were observed for HbA1c or other health markers.

Conclusion: This study has showed that accumulating sitting time in frequently interrupted patterns was beneficially associated with some markers of cardiometabolic health, while accumulating sitting time in longer, less interrupted bouts was adversely associated with some markers of cardiometabolic health in participants at high risk of type 2 diabetes.

P84 DUK | Longitudinal trypsin(ogen) as a measure of exocrine pancreatic function in slow progressors to type 1 diabetes

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Aims: In our recent cross-sectional investigation, trypsin(ogen), a biomarker of exocrine function, was lower in all stages of type 1 diabetes in children and young adults compared to diabetes-free first-degree relatives (FDRs). Here, we sought to investigate longitudinal trypsin(ogen) levels in an intriguing cohort of Slow Progressors (SP) to type 1 diabetes.

Methods: Longitudinal trypsin(ogen) levels were measured by Delfia Neonatal IRT kit (PerkinElmer; optimised in-house to detect levels <12.5 ng/mL) in BOX Study sera from SP (diagnosis delayed >10 years since detection of multiple islet autoantibodies) compared to age-and-gender-matched diabetes-free first-degree relatives (FDRs) ($n = 24$ exclusive pairs of SP/FDRs; $n = 10$ males; median follow-up years 7.6, range 1.0 to 28.0; age difference between paired samples 0.3 years median; range 0.0 to 2.8). A total of $n = 65$ paired measurements were included in the analysis with two to four-time points for each SP/FDR pair (age at first sample median 28.8; range 9.2–65.9 years; age at the last sample 41.5 median; range 15.0–69.3 years).

Results: Longitudinal trypsin(ogen) was lower in SP when compared to FDRs only in the last ($p < 0.0087$), but not the first available serum (Wilcoxon paired test). In FDRs trypsin(ogen) increased with age, but this effect was blunted in SP.

Conclusion: Longitudinal observations suggest that despite delayed progression and preserved endocrine function, exocrine decline is present in slow progressors to type 1 diabetes.

Acknowledgement: additional author – the BOX study group.

Basic and clinical science posters: Retinopathy

P85 | Smartphone funduscopy for diabetic retinopathy screening

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Aims: Smartphone funduscopy devices are comprised of lens devices connecting with smartphones and software applications to be used for mobile retinal image capturing and diagnosis of diabetic retinopathy. This is particularly beneficial to automate and mobilise retinopathy screening techniques and methods in remote and rural areas as those diabetes patients are often not meeting the required regular screening for diabetic retinopathy. This study aimed to review smart fundoscope devices and develop a smart fundoscope prototype and app.

Methods: A novel smartphone fundoscope was developed as a prototype. The lens is attached into a sterile plastic tube which securely holds the lens at the correct fixed distance from the smartphone. The tube is attached onto a smartphone case which enables it to fit tightly onto the phone. The camera is set to record video, and LED flash torch is switched on. A second prototype has a screw cap that can extend or retract the lens for fine tuning the image focus.

Results: The prototype 1 was tested and produces suitably high-resolution microscopic zoom images.

Conclusions: A smartphone app prototype was developed that can obtain fundus images by interfacing with the developed lens attachment. This app could be extended in future to apply a pre-trained machine learning model (neural network) within the smartphone to give stand-alone diagnosis. If the smartphone app is unable to classify the fundus image, images can be uploaded onto a cloud-based classification system, and to forward the fundus image to the ophthalmology expert for manual viewing and diagnosis.

Basic and clinical science posters: Screening and prediabetes

P86 | Pre-symptomatic adult type 1 diabetes case detection: Type 1 diabetes genetic risk-guided islet autoantibody screening in a general population

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Refer to Oral number A25.

P87 | GADA prevalence in the general population: The effect of age

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Refer to Oral number A33.

Basic and clinical science posters: Type 1 diabetes

P88 | Utility of the Hospital Anxiety and Depression Scale as a stratification tool in a South American cohort with type 1 diabetes

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Introduction: The most common mental disorder among patients with diabetes is depression (DP). Despite a fairly large number of works on the problem of the combination of depression and diabetes, data on the prevalence of depression in type 1 diabetes are inconclusive.
Objective: This study evaluated the prevalence of PD in type 1 diabetes and its association with metabolic control disorders.
Materials and Methods: The study included 163 patients with type 1 diabetes between 18 and 65 years old with a disease duration of 11.18 [4.28; 22.33] years. The control group included 75 practically healthy individuals. A general clinical examination and questionnaire were performed using a standard procedure for patient self-administration of the Hospital Anxiety and Depression Scale (HADS) to assess levels of anxiety and depression; consult with a psychiatrist to confirm the presence and severity of PD; monitoring of glucose levels at home by the patient. The statistical processing of the results was carried out using the computer statistical package SPSS Statistics 17.0 (SPSS) and Stat Soft Statistics 6.0.
Results: The results of the study indicate that the prevalence of PD among patients with type 1 diabetes is significantly higher (almost two times) than the prevalence of PD in the group of healthy individuals. It was found that female sex and age over 40 years are associated with the presence of PD.
Conclusion: The development of PD in type 1 diabetes is associated with impaired compensation of carbohydrate metabolism and an increased risk of hypoglycaemic episodes.

P89 DUK BS | Examination of longitudinal pancreatic exocrine function/mass of trypsin(ogen) after type 1 diabetes diagnosis compared to age- and sex-matched first-degree relatives

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Aims: Exocrine dysfunction and reduced pancreatic size are recognised features of type 1 diabetes. In a cross-sectional analysis, we recently validated the exocrine enzyme, trypsin(ogen), as a key biomarker before, at and after diagnosis of type 1 diabetes. However, there have been no longitudinal studies to examine trypsin(ogen) levels between the first and last available sample from people with type 1 diabetes and age- and sex-matched first-degree relatives (FDRs).
Methods: Serum trypsin(ogen) level was determined using the Delfia Neonatal immunoreactive trypsin(ogen) kit (PerkinElmer; optimised in-house to detect levels <12.5 ng/mL) in 108 cases and matched low-risk FDRs [49.1% male; median age at first sample 11.3 years (range: 1.3–53.8); median age at last sample 18.1 years (range: 6.0–73.1); median follow-up 4.5 years (range: 1.0–29.4)].
Results: Paired Wilcoxon tests showed that median trypsin(ogen) levels in cases were lower than FDRs across all ages ($p<0.0001$), including close (<6 months) to diagnosis ($n=67$; $p=0.0001$). Median trypsin(ogen) levels between the first and last sample increased in FDRs (median 11.7 ng/mL vs 14.4 ng/mL, $p=0.0029$), but not in cases (median 5.8 ng/mL vs 6.2 ng/mL, $p=0.94$). In multivariable linear regression modelling adjusted for age at last sample, trypsin(ogen) level at first sample ($p=0.0065$–<0.0001) was significantly associated with trypsin(ogen) levels at last sample in both cases and FDRs.
Conclusion: Independent of age, trypsin(ogen) levels were blunted in people with type 1 diabetes and not age- and sex-matched FDRs. Trypsin(ogen) level close to diagnosis is a predictor of future levels indicating ongoing communication between the exocrine and endocrine compartments after diagnosis of type 1 diabetes.
Acknowledgements: The BOX Study Group is comprised of the BOX co-ordinating and clinical team, Isabel Wilson, Rachel Aitken, and Clare Megson, and the local PIs: Drs Chitrabhanu Ballav, Atanu Dutta, and Michelle Russell-Taylor, Bucks Healthcare Trust, UK; Dr Rachel Besser, Oxford University Hospitals Trust UK, UK; Drs James Bursell and Shanthi Chandran, Milton Keynes University Hospital, UK, Dr Sejal Patel, Wexham Park Hospital, UK; Drs Anne Smith and Manohara Kenchaiah, Northampton General Hospital, UK; Dr Gomathi Margabanthu, Kettering General Hospital, UK; Drs Foteini Kavvoura and Chandan Yaliwal, Royal Berkshire Hospital, UK.

P90 DUK BS | Differential expression of classical HLA-I and induction of non-classical HLA-I in type 1 diabetes

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Aim: The upregulation of classical and non-classical HLA class I (HLA-I) molecules in the insulin-containing islets of individuals with type 1 diabetes has been previously reported. However, it remains unknown whether classical HLA-Is (HLA-A/B/C) are differentially regulated in type 1 diabetes. Moreover, the induction of non-classical HLA-I (HLA-E/F/G) molecules has not been studied in detail. Here, the expression of these HLA-I was explored in the pancreata of individuals with and without type 1 diabetes.
Methods: Pancreas sections were stained with antibodies raised selectively against HLA-A-B, HLA-E-F-G and insulin using multiplex immunofluorescence. Whole slide scans were analysed using the Indica HALO software.
Results: The expression of classical and non-classical HLA-I molecules was minimal in the islets of individuals without diabetes. They were upregulated in insulin-containing islets but diminished in insulin-deficient islets of individuals with type 1 diabetes. HLA-B expression was significantly higher than that of HLA-A. HLA-E was predominantly localised to alpha cells, whereas HLA-F-G were present predominately in beta cells. HLA-A and HLA-F were localised predominantly to the plasma membrane, whereas the distribution of HLA-B and HLA-G-E appeared predominately cytoplasmic. HLA-I isoforms were differentially expressed across lobes within islets in type 1 diabetes.
Conclusions: This study provides insights into the relative distribution of classical and non-classical HLA-Is in the pancreata of individuals with type 1 diabetes. The differential expression of HLA-I could indicate differences in the islet microenvironment. We suggest that the HLA-I isoform expression balance may influence the extent and pace of beta cell demise during autoimmune attack.

DIABETIC Medicine

P91 | Urgent insulin starts at diagnosis of diabetes: Is it always type 1 diabetes?

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Background: Individuals with new-onset hyperglycaemia due to suspected type 1 diabetes are started on insulin urgently. However not everyone has autoimmune diabetes. We studied 39 individuals presenting to a hospital-based diabetes service and treated with insulin from diagnosis to assess the eventual aetiological label.
Methods: All individuals had four islet autoantibodies and c-peptide/glucose measured. Type 1 diabetes was confirmed with ≥2 positive autoantibodies. For those with 0–1 positive autoantibodies, a combination of clinical presentation, biochemistry and other relevant diagnostic testing were used for classification.
Results: Median age was 41 years, 67% were male and median BMI was 26.9 kg/m^2. Two individuals had cancer immunotherapy-associated diabetes; two had type 3c diabetes and two remained of uncertain aetiology.
Twenty-four people were confirmed with type 1 diabetes (one had negative genetic testing), and nine with type 2 diabetes. Characteristics of type 1 vs type 2 diabetes were (median (IQR)): Age 40 year (28–55) vs 39 year (36–57), $p=0.3$; BMI 24.7 kg/m^2 (20.9–26.9) vs 33.5 kg/m^2 (28.0–40.8), $p=0.02$; HbA1c 127 mmol/mol (103–140) vs 118 mmol/mol (103–121), $p=0.33$; c-peptide 290 pmol/L (246–449) vs 1120 pmol/L (610–1343), $p=0.002$; blood ketones 4.0 mmol/L (0.7–5.6) vs 1.1 mmol/L (0.3–3.6), $p=0.04$. Lower BMI, lower c-peptide, and higher blood ketones were associated with type 1 diabetes.
Conclusions: Sixty per cent of people with suspected type 1 diabetes were confirmed to have autoimmune diabetes. Clinical features were not sufficiently discriminating on presentation to identify those who could avoid insulin.
Because pathways for managing type 1 and type 2 diabetes are increasingly divergent, we recommend that a diagnosis of type 1 diabetes is subsequently reassessed. Individuals reclassified as type 2 diabetes should receive timely de-intensification of insulin treatment with initiation of other agents according to NICE guidelines.

P92 | A novel remote approach to recruiting and studying the progression of type 1 diabetes close to diagnosis

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Refer to Oral number A34.

P93 | Beta cell prohormones in type 1 diabetes

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Aims: Upon diagnosis of type 1 diabetes significant dysfunction within the pancreas occurs. The objective was to investigate biomarkers that accurately reflect pancreatic health/function in individuals with type 1 diabetes.
Methods: Samples were analysed from a randomised controlled trial investigating the effects of Ustekinumab in 72 participants aged 12–18 years diagnosed with new-onset type 1 diabetes. Blood samples for the measurement of c-peptide, proinsulin, IAPP and proIAPP were collected at baseline, 6 and 12 months.
Results: From baseline to 12 months, fasting intact proinsulin declined from 3.7 to 2.1 pmo/L ($p=0.035$) and from 4.9 to 2.27 pmol/L ($p=0.039$), fasting c-peptide declined from 36.1 to 18.5 pmol/L and from 38.8 to 18.3 pmol/L ($p=0.0000$ for both) in the treated and placebo group respectively.
In the full cohort, from baseline median IAPP decreased from 206.7 to 137.3 pg/mL after 12 months ($p=0.051$). Conversely, median ProIAPP increased from 34.8 to 45.2 pg/mL ($p=0.0000$). Mixed model linear analysis showed no significant differences between treatment and placebo groups at the 6 and 12 month visits for all markers. There was a significant increase observed in ProIAPP levels from baseline to 6 months ($p=0.002$) in the treated group only, while the ProIAPP:IAPP ratio increased from baseline to 12 months in both treated ($p=0.0000$), and placebo

(0.0002). The proinsulin: c-peptide ratio increased significantly from baseline to 6 months only in the treated group ($p = 0.01$).

Conclusions: In contrast to proinsulin levels and IAPP, pro-IAPP levels rise in the first year after diagnosis. The rise may be greater during immune intervention, suggesting that it may be a useful marker in trials. Further studies in larger populations are required.

P94 | Utility of gene expression assays and T cell suppression assays to assess umbilical cord-derived mesenchymal stromal cells (MSCs) for islet transplantation

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Aims: Transplantation of MSCs alongside islets improves islet engraftment and function1 via immunomodulatory effects on the transplant niche. However, there is variation in the efficacy of this due to differences in MSCs derived from different sources and donors. MSCs immunomodulatory effects are reported to be improved by licensing with inflammatory cytokines (e.g. IFNγ, IL-1β, TNFα). Selecting an optimal MSC line and state for islet co-transplantation is essential. Here, we used 2 different *in vitro* assays to assess licensed and unlicensed umbilical cord derived MSCs (UC-MSCs) from different donors.

Methods: RT2 arrays compared UC-MSCs in unlicensed vs licensed states to identify gene expression patterns associated with favourable immunomodulation. Inhibition of T cell proliferation was assessed using transwell assays.

Results: Licensing UC-MSCs with IFNγ upregulated CD274, IDO1 and CSF1 (Fold change (FC): 8.3, 1106, 6.61; $p < 0.01$). Including IL-1β and TNFα also upregulated PDCD1LG2 and CXCL8 (FC: 8.17, 361; $p < 0.01$). UC-MSC dose-dependent inhibition of T-cell proliferation was observed across donors and was greater with cell-to-cell contact ($p < 0.001$). UC-MSCs licensed with IFNγ, IL-1β and TNFα were less potent at inhibiting T cell proliferation than unlicensed controls (Inhibition: $55.5 \pm 13.8\%$ vs $44.7 \pm 14.1\%$; $p < 0.001$ $n = 7$).

Summary: Licensing UC-MSCs is associated with upregulation of immunomodulatory associated genes but inhibition of T cell proliferation was not greater. Careful selection of *in vitro* assays to guide selection of UC-MSCs for preclinical *in vivo* studies needs consideration.

P95 | Beyond arrays: Leveraging whole genome sequencing on 149,265 individuals to provide insight into ancestry-specific type 1 diabetes risk in the population

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Refer to Oral number A49.

P96 | Type 1 diabetes feasibility study exploring the relationship between carbohydrate counting and disordered eating

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Aims: A feasibility study to investigate the relationship between carbohydrate counting and disordered eating in patients with type 1 diabetes. Data previously presented (Diabetes UK Conference 2023) found no relationship between years spent carbohydrate counting and disordered eating. Discussions with young people with type 1 diabetes suggested the age patients take responsibility for carbohydrate counting might be an additional factor to consider.

Methods: Forty-two participants with type 1 diabetes from the UK, aged 16 to 55 (mean age 37 years, mean diagnosis age 21 years) completed an online questionnaire using validated screening measures, Diabetes Eating Problem Survey (DEPS-R), and Eating Disorder Examination Questionnaire (EDEQ), and bespoke questions about carbohydrate counting to measure the relationship between counting carbohydrate intake and disordered eating.

Results: Analysis identified a weak negative correlation between the age at which participants took responsibility for carbohydrate counting and self-reported disordered eating (EDEQ $r = -0.382$ $p = 0.034$), but a moderate negative correlation with diabetes-specific eating problems (DEPS-R $r = -0.518$ $p < 0.001$).

Conclusion: Our preliminary data suggest a possible association between the age of initiating self-management of

carbohydrate to insulin dosing and adverse eating behaviours. This might suggest that the younger a person living with type 1 diabetes takes responsibility for carbohydrate counting, the higher their potential risk of disordered eating. Future work will develop novel measures of counting carbohydrates in practice, directed by lived experience and healthcare practitioners' testimonials to ascertain potential interventions and fully powered studies in order to explore potential confounders such as age of diagnosis.

P97 DUK | Artificial intelligence (AI)-based image analysis pipelines to study pancreas architecture through development

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Aim: The aim of the study was to create validated, tissue specific, AI-based classifiers for analysis of routinely stained histological pancreas sections from different biobanks.
Methods: AI-based image analysis pipelines (HALO, Indica) were established using dual chromogen (chromogranin A and cytokeratin 19) and/or haematoxylin and eosin stained fetal, neonatal and paediatric pancreas sections from HDBR ($n=10$), EADB ($n=73$) and nPOD ($n=16$) biobanks. Pipeline outputs include endocrine/exocrine area, islet size (>500 μm^2) and density, and ductal tissue area in both healthy controls and those with type 1 diabetes.
Results: Analysis of pancreas composition throughout early human development revealed that in fetal samples, most pancreas tissue was undifferentiated, but ducts made up the greater proportion of differentiated tissue. By contrast, from birth acinar tissue was predominant.
Endocrine cell density was at its highest during the fetal stage but decreased with age. Endocrine area as a percentage of total tissue area was greater in donors without diabetes ($4.42\pm0.41\%$) vs those with type 1 diabetes ($1.30\pm0.10\%$; $p<0.0001$). There was no change in endocrine area across age groups in individuals with type 1 diabetes, however there was a significant reduction in islet density in those aged ≥13 years (7.03 ± 0.64 islets/mm^2), compared to those <7 years (15.0 ± 2.81 islets/mm^2; $p=0.0148$).
Conclusions: Pancreas architecture changes extensively across all cellular compartments during development. Understanding these changes in healthy individuals and determining whether they differ in type 1 diabetes may reveal periods during which beta cell autoimmunity is initiated and thereby provide insights into causal mechanisms.

P98 DUK | Characterisation of islet alterations in European bank voles: An example of naturally occurring virally associated diabetes

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Aims: The causes of islet autoimmunity in individuals with type 1 diabetes are still unknown, but viruses are frequently implicated. Few systems are available in which the impact of naturally acquired viral infections on beta cells can be assessed. Bank voles (*Myodes glareolus*) develop a form of diabetes associated with Ljungan virus infection. Our aim was to characterise the cellular and molecular changes in vole islets and determine how these correlate with viral infection and autoimmunity.
Methods: AI-based image analysis pipelines (HALO, Indica) were developed to interrogate pancreas sections from voles with ($n=24$) and without ($n=24$) diabetes. These were stained with haematoxylin and eosin (H&E), Periodic Acid Schiff (PAS; to stain glycogen) and antibodies directed against endocrine hormones and Ljungan virus viral protein 1 (VP1) capsid protein. Islet autoantibodies in bank vole sera were assessed using LIPS assays.
Results: Voles with glucose levels in the diabetic range had a significant reduction in endocrine area and islet density when compared to voles with normal glucose. This was associated with loss of insulin-containing beta cells, the presence of large vacuolar (balloon) cells in islets and changes in islet architecture. Ljungan virus VP1 immunostaining was found in residual beta cells of voles with diabetes, which was associated with the presence of vacuolar cells. These cells stained positively with PAS, suggestive of extensive glycogen accumulation.
Conclusions: Since there is increasing evidence that viral infection may drive human diabetes, study of bank voles may provide new mechanistic insights into the evolution of diabetes in humans.

Basic and clinical science posters: Type 2 diabetes

P99 | Semaglutide has a marked benefit for glycaemic and weight outcomes compared to other GLP-1 receptor agonists and SGLT2-inhibitors: UK real-world effectiveness study

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Aim: Randomised control trials have shown superior glycaemic efficacy and weight outcomes with Semaglutide in people with type 2 diabetes, but real-world effectiveness data are limited. We evaluated real-world HbA1c, weight and short-term discontinuation (a proxy of tolerability) outcomes with Semaglutide vs other GLP-1 receptor agonists (GLP1-RA) and SGLT2 inhibitors (SGLT2i) treatments.
Methods: We studied 746 people with type 2 diabetes in UK primary care (Clinical Practice Research Datalink) initiating Semaglutide once-weekly between January 2019–October 2020, compared to 12,334 individuals initiating GLP1-RA (Dulaglutide, Liraglutide) or SGLT2i (Canagliflozin, Dapagliflozin, Empagliflozin). Baseline characteristics were: HbA1c 75.6 ± 16.1 mmol/mol, age 59.2 ± 10.7 years, 62% male. Overlap weights were used to balance treatment arms based on the probability of receiving the medication the individual initiated.
Results: Mean 12 month HbA1c reduction was greater with Semaglutide (17.2 mmol/mol [95% CI 16.3;18.2]) compared with other GLP1-RA (11.9 mmol/mol [95% CI 11.2;12.4]) and SGLT2i (11.6 mmol/mol [95% CI 11.3;11.9]) treatments. Mean 12 month weight reduction was also greater with Semaglutide (4.8 kg [95% CI 4.4;5.1]) vs other agents (other GLP1-RA: 2.6 kg [95%CI 2.4;2.8], SGLT2i: 3.7 kg [95% CI 3.6;3.8]). With Semaglutide, females had a higher weight reduction (5.6 kg [95% CI 5.1;6.2]) compared with males (4.0 kg [95% CI 3.5;4.5]), despite similar glycaemic response. The 6 month discontinuation risk was similar to Semaglutide (19.9% [95% CI 18.1;21.6]) compared to GLP1-RA (17.1% [95% CI 16.0;18.1]) and SGLT2i (20.9% [95% CI 20.3;21.4]).
Conclusions: The real-world effectiveness of Semaglutide for glycaemic and weight outcomes is markedly greater than for other GLP1-RA and SGLT2i, with similar tolerability. Findings support the use of Semaglutide in routine clinical practice for people with type 2 diabetes.
Acknowledgement: MASTERMIND consortium.

P100 CS | Using crossover trial data to test the proposed five diabetes subgroups from cluster analysis for targeting treatment

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Objectives: Precision medicine aims to target treatment to people most likely to benefit. This could be undertaken though creating subgroups or directly predicting the outcomes of interest using continuous features. We aimed to compare these approaches for targeting glucose lowering treatment.
Methods: We identified the Scandinavian five clusters (Ahlqvist et al.) in the TRIMASTER randomised crossover trial of canagliflozin, sitagliptin, and pioglitazone ($n = 405$). We compared differential HbA1c responses of the cluster strategy and linear mixed effect models using routine clinical features: baseline HbA1c, body mass index, estimated glomerular filtration rate, sex and age at diabetes diagnosis. We then compared achieved HbA1c for the predicted most effective treatment and least effective treatment with both strategies.
Results: Clusters in TRIMASTER were similar to those described in the original study. The model with simple clinical features explained more HbA1c variation compared with clusters, R-squared 32.2% and 14.8% respectively. Comparison of achieved HbA1c for predicted most and least effective treatments revealed greater glycaemic improvement for the model strategy with a 2.7 mmol/mol [95% CI 1.3;4.0] better achieved HbA1c, compared with 1.9 mmol/mol [95% CI 0.6;3.3] difference for the cluster strategy. For the model strategy, 41.5% of participants experienced a 3 mmol/mol or greater improvement on their predicted most effective treatment compared with their predicted least effective treatment, compared with 17.5% for the cluster strategy.
Conclusions: Treatment response to glucose lowering therapy differs by clusters in trial participants, but models based on simple continuous clinical features can better identify individuals with clinically relevant differences in glycaemic outcomes with specific medications.
Acknowledgement: On behalf of the TRIMASTER study group.

DIABETIC Medicine

P101 | Metabolic mechanisms underpinning diabetes remission following Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG): A systematic review and meta-analysis

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Aims: The mechanism of diabetes remission following RYGB and SG independent of calorie restriction and weight loss remains unclear. We undertook a systematic review and meta-analysis to investigate the role of various metabolic markers (e.g. Adiponectin, GLP-1, GLP-1, GIP, Leptin, Adiponectin, Ghrelin, FGF-18, PYY, Matsuda-index and Homeostasis model assessment of beta cell function (HOMA-B)) on diabetes remission.

Methods: We included human studies alongside type 2 diabetes (age >18 years old) with obesity (BMI[3] 30 kg/m^2) who have undergone RYGB, SG and Very low Calorie Diet (VLCD). 234 studies were identified across six databases (minus duplications). Fifty-nine studies were suitable for qualitative synthesis and 56 for quantitative. Review Manager v5.4 and IBM SPSS for Windows (v28.0.1.1) were used for meta-analysis and additional statistics respectively.

Results: Data are presented as Standardised Mean Difference with 95% confidence intervals (CI), alongside *p*-values for significance. RYGB and SG was associated with significant improvement in HOMA-B measurements (RYGB = −0.67; 95% CI: −0.77 to −0.57, $p < 0.00001$ and SG = −1.00; 95% CI: −1.12 to −0.88, $p < 0.00001$). Adiponectin and Matsuda index was significant increased with RYGB (1.22; 95% CI: 0.61–1.84, $p = 0.0001$ and 3.00; 95% CI:0.77–5.23, $p = 0.008$ respectively). No difference was observed for other metabolic markers that were studied: GLP-1, GIP, Leptin, Ghrelin, PYY for RYGB; GLP-1 and FGF19 for SG and Leptin, GLP-1, GIP and Ghrelin for VLCD.

Conclusion: Diabetes remission following RYGB and SG was primarily driven by improvement in beta cell function with improvement insulin resistance markers also observed for RYGB. No other metabolic mechanism explaining diabetes remission was observed based on clinical studies.

P102 | Metabolic effects of Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG) underpinning diabetes remission: A systematic review and meta-analysis

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Aims: This systematic review and meta-analysis appraised the characteristics underpinning diabetes remission and clinical outcomes for RYGB vs SG.

Methods: Human studies with an adult population (age >18 years old), type 2 diabetes diagnosis with obesity (body mass index (BMI)[3] 30 kg/m^2), receiving either RYGB or SG. 234 studies were identified across six databases (minus duplications). Fifty-nine studies were suitable for qualitative synthesis and 56 for quantitative. Review Manager v5.4 and IBM SPSS for Windows (v28.0.1.1) were used for meta-analysis and additional statistics respectively. PROSPERO ID: CRD42022312733.

Results: Crude annualised diabetes remission rate (ARR) was 6.98 ± 16.19 for RYGB ($p = 0.046$) vs −2.75 ± 4.94 for SG ($p = 0.080$). Differences in other metabolic outcomes, calculated as the standardised mean difference (SMD) with confidence intervals (CI), are BMI (RYGB: −2.73, [95% CI: −3.14 to −2.32], $p < 0.000001$; SG: −2.82, [95% CI: −5.04 to −0.60] $p = 0.01$), glucose (RYGB: −1.01, [95% CI: −1.25 to −0.77], $p < 0.00001$; SG: −0.82, [95% CI: −1.29 to −0.35], $p = 0.0007$), HbA1c (RYGB: −1.58, [95% CI −2.16 to −1.00], $p < 0.00001$; SG: −1.42, [95% CI −1.69 to −1.15], $p < 0.00001$); insulin (RYGB: 0.16, [95% CI: −0.19 to −0.50], $p = 0.37$; SG: −3.00, [95% CI: −3.17 to −2.82], $p < 0.00001$) and fat mass (RYGB: −2.56, [95% CI: −4.49 to −0.64] $p = 0.009$; SG: −1.69, [95% CI: −4.58 to 1.21] $p = 0.25$).

Conclusion: Significant HbA1c, glucose and BMI reduction was observed with both RYGB and SG. Diabetes remission however was achieved primarily by RYGB driven by significant reductions in fat mass and increases in insulin level.

P103 | Type 2 diabetes and other cardiometabolic diseases in a cohort with oncological disease from a South American cohort

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Introduction: Unfortunately, cardiovascular (CV) complications from anticancer therapies can negatively affect the improvement of treatment outcomes. The aim of the study was to assess the prevalence of classic CV risk factors among patients diagnosed with de novo cancer and, therefore, to identify CVR.
Methods: Diagnostic data sets of resting electrocardiogram, blood samples, and transthoracic echocardiogram were analysed in 343 consecutive patients who did not have any cardiovascular disease that could adversely affect the introduced treatment.
Results: Our cohort included 4.4% patients with kidney cancer, 7.3% with colorectal cancer, 26.5% with haematological malignancies (HNMs) and 61.8% with breast cancer. The risk estimated by SCORE was $4.56 \pm 5.07\%$. Patients with breast cancer had lower cardiovascular risk than those with NMH ($p = 0.001$) and kidney cancer ($p = 0.002$). In addition, the NMH group had much higher levels of natriuretic peptides ($p < 0.001$) and creatinine ($p = 0.008$) than the breast cancer patients.
Discussion: The comparison with the population data showed that our patients were more frequently smokers, hypertensive and diabetic, less frequently hypercholesterolemia.
Conclusions: Patients with a new diagnosis of cancer, candidates for potentially cardiotoxic medical treatment, have a higher prevalence of significant cardiovascular risk factors and therefore should be followed by a multidisciplinary team during the therapeutic process.

P104 | Changes in the cardiometabolic profile derived from bariatric surgery in a South American cohort diagnosed with type 2 diabetes

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Objective: The objective of the study was to evaluate the cardiometabolic impact of bariatric surgery in patients with and without type 2 diabetes.
Method: HE performed a study retrospective with 76 patients, divided in two groups, 24 (31.58%) people with diabetes and 52 (68.42%) people without diabetes. Baseline measurement of cardiometabolic variables (body mass index – BMI, blood glucose, HbA1c, total cholesterol-TC, HDL-C, LDL-C, triglycerides-TG, blood pressure) and the changes at 3, 6 and 12 months after bariatric surgery.
Results: He clusters with diabetes presented values average initials significantly further tall of glycemia, HbA1c, TG ($p < 0.001$), TC and LDL-C ($p < 0.05$) compared to people without diabetes. 95.8% of people with diabetes It was poorly controlled, with an average HbA1c of 9.65%, mostly (70.9%) in grade III obesity; the not people with diabetes in obesity degree II–III (93%). The surgery bariatric produced improvement in he BMI and in all the variables cardiometabolic from 3 months. Twelve months after surgery was resolution of the 100% of the obesity, DM2, HBP, hypertriglyceridemia and alterations in LDL-C and HDL-C in the two groups, as well as the hypercholesterolemia in people without diabetes and in 95.8% of people with diabetes.
Conclusion: Bariatric surgery is an effective option for individuals who do not achieve supervised weight loss. Its effects extend beyond significant weight loss, as it also improves comorbidities associated with obesity.

P105 | Artificial intelligence (AI)-assisted analysis of human pancreata reveals separate 'high fat' and 'high fibrosis' phenotypes in donors with a diagnosis of type 2 diabetes in life

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Aims: The role of intra-pancreatic lipid and collagen deposition in type 2 diabetes pathogenesis remains unclear. We sought to examine this in pancreata from organ donors with and without diabetes.
Methods: Donors were selected from the Quality in Organ Donation whole pancreas tissue bank (QUOD-PANC): 12 without diagnosed diabetes with confirmed HbA1c <42 mmol/mol and body mass index (BMI) <25 kg/m^2; 12 with confirmed absence of diabetes and BMI > 25 kg/m^2; and 12 with diagnosed type 2 diabetes and BMI > 25 kg/m^2. Tissue biopsies were collected from eight anatomically defined regions representative of the whole organ with each further subdivided into anterior and posterior formalin-fixed paraffin-embedded blocks for histological analysis. Haematoxylin and Eosin, Sirius Red Fast Green and Chromogranin A immunohistochemical staining was performed on serial sections from all blocks to assess adipocytes, collagen and islets respectively. Quantitative analysis of stained tissue was carried out using the HALO AI platform. Intracellular lipid droplet area was quantified by transmission electron microscopy.
Results: Pancreatic adipocyte ($p = 0.0075$) and collagen ($p < 0.0001$) percentage areas were both highest in donors with diabetes but were not associated with each other. Indeed, pancreata with high fat and organs with high collagen (>40% of total pancreas area) appeared to form two separate subgroups. Islet circularity was reduced in donors with diabetes diagnosis ($p = 0.0011$). Intracellular lipid content in acinar cells was reduced in diabetes ($p = 0.0044$) and negatively correlated with adipocyte area ($r = -0.49$, $p = 0.0032$).
Conclusions: Distinct 'high fat' and 'high fibrosis' pancreatic exocrine phenotypes may be present in those diagnosed with type 2 diabetes.

P106 | Caerulein precursor fragment-SE3 (CPF-SE3) stimulated insulin release from clonal pancreatic cells and improved glucose tolerance in high fat-fed mice

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Aim: CPF-SE3 was a previously described anti-microbial peptide isolated from the skin secretions of *Silurana tropicalis*. This study investigates insulinotropic effects of CPF-SE3 and associated mechanisms of actions.
Method: Insulinotropic-releasing effects were assessed by incubating BRIN-BD11 cells with graded concentrations of CPF-SE3 (0–3 μM) in the presence or absence of known modulators of insulin secretion and extracellular calcium. Cytotoxicity and effects of CPF-SE3 on cell viability, glucose stimulated insulin secretion, membrane potential and intracellular concentration were investigated.
Results: CPF-SE3 significantly stimulated concentration-dependent insulin secretion at all concentrations tested. The highest stimulatory effect of the peptide was observed at 3 μM (2.9-fold, $p < 0.001$) while the lowest effect (2.40-fold, $p < 0.001$) was observed at 0.001 μM of CPF-SE3. These effects were non-toxic and did not affect cell viability. Insulinotropic actions of CPF-SE3 reduced in the presence of diazoxide 20% ($p < 0.05$) and 58% ($p < 0.001$) verapamil 19.8% ($p < 0.05$) and 51.7% ($p < 0.001$), respectively, and in the absence of extracellular calcium 50.3% ($p < 0.001$). Enhanced insulin-releasing effects of CPF-SE3 was observed in the presence of KCl ($p < 0.001$). CPF-SE3 increased membrane potential (27%, $p < 0.01$) and intracellular calcium concentration (31%, $p < 0.01$) in BRIN-BD11 cells. Improved glucose tolerance (43%, $p < 0.01$) and insulin secretion (38%, $p < 0.01$) were observed in high-fat fed mice receiving intraperitoneal injection of the peptide.
Conclusion: Insulinotropic action of CPF-SE3 was better than other orthologues in the CPF family. Results obtained also suggest the involvement of the KATP channel and this motivates efforts to further the therapeutic potential of the peptide.

P107 | Investigation of anti-diabetic effects of various extracts of *Jatropha tanjorensis* (*J. tanjorensis*) in BRIN-BD11 clonal pancreatic beta cells

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Aim: Beneficial effects of *J. tanjorensis* extracts in African traditional medicinal practices for the management of type 2 diabetes have been reported. However, mechanisms through which these extracts exert their anti-diabetic actions have not been widely studied.
Methods: Effects of various aqueous extracts of root, leaf and bark *J. tanjorensis* (0–1000 g/mL) on insulin-release, cytotoxicity and cell viability were investigated using BRIN-BD11 cells. Effects of leaf extracts (100 g/mL) on glucose-stimulated insulin secretion and changes in insulinotropic actions in the presence of known modulators as well as the absence of extracellular calcium were also assessed.
Results: *J. tanjorensis* extracts stimulated insulin secretion from BRIN-BD11 cells at concentrations ≥0.1 g/mL for leaf (1.7-fold, $p<0.001$), 1 g/mL for bark (2-fold, $p<0.05$) and 10 g/mL for root (1.8-fold, $p<0.05$) extracts. These insulin-releasing effects were not associated with significant release of lactate dehydrogenase at concentrations ≤100 μg/mL for leaf, 100 μg/mL for bark and 100 μg/mL for root extracts. Effects of the leaf extracts were inhibited by diazoxide (51%, $p<0.01$), verapamil (29%, $p<0.05$) and in the absence of intracellular calcium (41%, $p<0.01$). However, effects of the extract were enhanced by KCl (2.3-fold, $p<0.01$). Improved intracellular calcium concentration were observed in cells treated with the leaf extracts of J. tanjorensis (2.4-fold, $p<0.01$).
Conclusion: The results confirm insulinotropic actions of *J. tanjorensis* extracts and suggest that the KATP-dependent pathway may be involved in the mechanism of action.

P108 | Assessment of glycocalyx, by the perfused boundary region, in type 2 diabetes and early diabetic nephropathy

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Aim: The aim of the study was to determine whether the endothelial cell surface layer integrity (glycocalyx (EG)) is compromised in type 2 diabetes with and without early diabetic nephropathy.
Methods: Endothelial cell surface layer was assessed in 306 participants by sublingual microscopy. Glycocheck software measured the width distribution of the red blood cell (RBC) column and calculated the perfused boundary region (PBR) from the 50th and 90th percentiles. Higher PBR represents poorer glycocalyx integrity as RBCs increasingly interact with the vessel wall. Blood and urine sampling, anthropometry and imaging were performed under standardised conditions, as part of the BEAt-DKD Exeter study.
Results: A total of 106 Controls, 148 type 2 diabetes and 49 type 2 diabetes+microalbuminuria participants with the following characteristics were studied: Controls (age: 70.0 years range: 47–84, 54.7% male, systolic: 135.4±15.5 mmHg, diastolic: 75.8±8.6 mmHg, BMI:26.6±4.5 kg/m^2, UAER:8.1±7.3 μg/min, UACR:0.94±0.60 mg/mmol, eGFR:79.5±9.6 mL/min/1.73 m^2); type 2 diabetes (age: 71.1 years range: 53–84, 62.2% male, systolic: 139.4±14.8 mmHg, diastolic:75.7±8.3 mmHg, BMI:30.9±5.6 kg/m^2, diabetes duration: 14.6±8.6 years, UAER:9.7±7.1 μg/min, UACR:1.14±0.65 mg/mmol, eGFR:73.4±14.8 mL/min/1.73 m^2); type 2 diabetes+microalbuminuria (age:73.9 years range: 56–84, 71.4% male, systolic:143.6±16.5 mmHg, diastolic: 75.9±7.9 mmHg, BMI:31.7±5.6 kg/m^2, diabetes duration:18.8±9.0 years, UAER: 69.2±71.2 μg/min, UACR: 7.13±5.77 mg/mmol, eGFR:72.7±13.7 mL/min/1.73 m^2).
PBR was higher in women than men (2.03±0.24 vs 1.93±0.20 μm, $p=0.0001$) and altered by age. PBR in controls, type 2 diabetes and type 2 diabetes+microalbuminuria did not differ, with or without correction for age and sex. PBR was not related to UACR, UAER or eGFR. The key determinant of PBR in type 2 diabetes was diabetes duration (R 0.2, $p=0.04$). Good glycaemic control appeared to improve PBR (HbA1c ≥55 vs <54 mmol/mol:1.98±0.24 vs 1.91±0.20 μm, $p=0.01$), however, this difference was lost when controlling for age, sex and diabetes duration.

Conclusion: PBR (glycocalyx integrity) is not impaired in diabetes with or without early-stage diabetic nephropathy (microalbuminuria).

P109 DUK | Exploring the relationship between gut microbiome composition, lifestyle factors and type 2 diabetes by microbiome-wide association analysis

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Aims: The gut microbiome composition associated with type 2 diabetes status. We aimed to characterise the differences in gut microbiome composition between individuals with type 2 diabetes and those without and investigated the role of lifestyle in these associations.
Methods: We evaluated 4548 individuals, of whom 65 had a medical history of type 2 diabetes and information about stool 16S rRNA sequencing along with accompanying questionnaires capturing lifestyle, dietary habits and medical history. The association between the relative abundance (RA) of microbial genera and type 2 diabetes was examined using microbiome-wide association analysis (MWAS) by MaAsLin2 and ANCOM-BC methods for prevalent taxa >0.1. These models included adjusted for geographical region, age, gender and multiple testing corrections.
Results: Medical history of type 2 diabetes is inversely associated with longer sleep duration, yoga practising, a diet higher in fibre ($q < 0.05$) and microbial alpha diversity ($p < 0.05$). RA of four bacteria taxa were associated with type 2 diabetes ($q < 0.05$) in both MWAS methods. RA of *Shigella* was higher in individuals with type 2 diabetes, while RA of *Lachnospira*, *Terrisporobacter* and *Senegalimassilia* were lower. When we adjusted for type 2 diabetes lifestyle factors, *Lachnospira* showed an independent association with type 2 diabetes status.
Conclusion: Lifestyle factors explained the association for three out of four taxa associated with type 2 diabetes in this data set, suggesting that they should be considered for a better understanding of the role of lifestyle microbiome interplay in type 2 diabetes.
Acknowledgement: Statistical multi-omics.

P110 DUK | Alterations in G-protein-coupled receptors (GPCR) regulation after high fat diet feeding

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Background and Aims: GPCRs are of great interest to the pharmaceutical industry given their historic success in drug discovery programmes. However, despite the great number involved in metabolism, only one GPCR is currently targeted therapeutically for diabetes. We sought to examine how disrupted GPCR regulation, in combination with high fat diet feeding, impacts the development of type 2 diabetes.
Methods: Female *C57BL/6* mice heterozygous for the lysosomal trafficking protein GPRASP1 (a GPCR-degrading protein) were fed either chow or high fat/high cholesterol diet (HFD) for 12 weeks to induce obesity and type 2 diabetes ($n = 10$ HET and $n = 16$ WT).
Results: Baseline metabolic measurements showed no difference in weight, fat mass or glucose homeostasis in 3-month-old mice fed chow diet. However, mice at 6 months exhibited blunted glucose homeostasis. Analysis of hepatic tissues also showed altered levels of markers of the insulin signalling pathway in older mice. Next, we assessed the impact of HFD- although no changes were found at the start of the experiment, after HFD exposure heterozygous mice had significantly greater fat and lean mass. Although not significant, these mice exhibited an indication of type 2 diabetes development suggesting this to be augmented by the end of study.
Summary: Taken together, these data indicate that disruption of GPCR regulation, through deletion of an important lysosomal sorting protein, can impact metabolic health. Specifically, 6-month-old mice displayed blunted glucose homeostasis that was accelerated during HFD-feeding. This presents a novel target for therapeutic intervention.

Basic and clinical science posters: Vascular and endothelial function

P111 DUK | Exploring myeloperoxidase-driven lipid oxidation in diabetes

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Background: Lipid oxidation in diabetes often involves myeloperoxidase, an enzyme linked to inflammation. Elevated levels of myeloperoxidase in diabetic conditions can accelerate the oxidative stress on lipids, contributing to endothelial cell damage. This process is intricately connected to complications like atherosclerosis and cardiovascular issues seen in diabetes. Understanding the interplay between lipid oxidation and myeloperoxidase provides valuable insights for developing targeted therapies to mitigate diabetic complications.
Aims: This study investigated the effects of myeloperoxidase-derived oxidised lipids on endothelial cell health and angiogenesis.
Methods: The enzymatic oxidation of low-density lipoproteins (LDL) was performed by mixing 1M hydrochloric acid, myeloperoxidase (100, 200 or 400 ng/mL, 45 μL), 1.6 mg LDL and 0.05M hydrogen peroxide. Lipids were extracted and oxidised lipids (cholesterol and phospholipids) were measured by liquid chromatography-mass spectrometry. Human endothelial cells were cultured in hyperglycaemic environment and cell viability and angiogenesis capacities were analysed.
Results: Oxidised phosphatidylcholines and 7-keto cholesterol levels were significantly higher ($p < 0.05$) in LDL treated with 200 or 400 ng/mL of myeloperoxidase. Endothelial cell viability and angiogenesis was significantly decreased when cells treated with oxidised LDL.
Conclusions: In conclusion, our findings reveal a consequential impact on endothelial cells, with decreased viability and impaired angiogenesis observed in the presence of oxidised LDL. These results shed light on the potential mechanisms linking myeloperoxidase, lipid oxidation and diabetic complications, emphasising the need for targeted therapies to mitigate the adverse effects on vascular health in diabetes.

Clinical care and other categories posters: Audit

P112 | A clinical audit of technology use in people with type 3c diabetes at Stobhill Hospital Diabetes Clinic

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Aims: Type 3c diabetes is associated with exocrine and endocrine pancreatic damage, often requiring insulin and pancreatic enzyme replacement. Access to technologies to assist optimal glycaemic management in appropriate patients is important but variable. This study aimed to assess aetiology, management and prescription of flash glucose monitoring (Freestyle Libre) and HbA1c levels in people with type 3c diabetes attending Stobhill Diabetes Clinic.
Methods: Data (2014–2023) related to 125 individuals with type 3c diabetes (74.4% male, 25.6% female), mean age 59 years (23–92 years) was extracted from SCI-Diabetes database and anonymised. Age, sex, aetiology, social deprivation index (SIMDQ) and glycaemic control (HbA1c) were evaluated against insulin and Freestyle Libre 2 prescription.
Results: Alcohol-induced disease accounted for 50.4% of cases (51 male:12 female), followed by gallstone-induced (23.2%; 18 male:11 female). Only 24.8% achieved target HbA1c <58 mmol/mol, while 37.6% had HbA1c >75 mmol/mol. Insulin was prescribed to 94.4% ($n = 118$), with 34.7% ($n = 41$) also using Freestyle Libre 2. Only 9.8% of Freestyle Libre users had an HbA1c <58 mmol/mol, while 48.8% had HbA1c >75 mmol/mol. Regarding social deprivation (SIMDQ), 51.2% were from the lowest quintile and 20.8% from the second lowest quintile.
Conclusion: The majority of people with type 3c diabetes required insulin, had an HbA1c >75 mmol/mol and were from the 1st SIMDQ quintile with an only minority having access to Freestyle Libre. This study highlights inequity of access to technologies that requires to be addressed. Further research is essential to better understand how to meet the needs of people with type 3c diabetes.

P113 | An audit of HbA1c target attainment in young adults living with type 2 diabetes in West Hampshire

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Background: Individuals diagnosed with type 2 diabetes in youth or young adulthood are at increased risk of developing diabetes-related complications. In addition, the prevalence of type 2 diabetes disproportionally affects those from ethnic minority and socially deprived groups. Optimising glycaemic control is key to minimising these risks.
Aim: The aim of the study was to determine the proportion of young adults with type 2 diabetes under the care of West Hampshire Community Diabetes Service (WHCDS) achieving National Institute for Health and Care Excellence (NICE) recommended glycaemic targets (HbA1c ≤58 mmol/mol).
Methods: We performed a search of adults with type 2 diabetes aged 18–35 years currently receiving care from WHCDS and collected data on age at diagnosis, sex, current body mass index (BMI) and HBA1c, home postcode and co-morbidities.
Results: We identified 58 young adults aged 18–35 years with a diagnosis of type 2 diabetes of whom 62% were female and 70% of White British ethnicity. Median (range) age at diagnosis was 24 years (10, 34) and median (range) BMI was 34.7 kg/m^2 (24, 65). Median index of multiple deprivation score was 7th decile. 46.6% had a co-existent mental health condition. Median (range) HbA1c was 73 mmol/mol (39, 126), and HbA1c ≤58 mmol/mol was achieved in 36.2%.
Conclusions: A third of young adults living with type 2 diabetes in West Hampshire are achieving NICE recommended glycaemic targets. In addition, nearly half also live with a mental disorder that may impact their ability to self-care for their diabetes. NHS services must adapt and evolve to provide appropriate support for this patient population that takes into account other important co-morbidities.

P114 | Clinical audit on diagnosis and management of hyperosmolar hyperglycaemic state (HHS) in Nottingham University Hospitals against national guidelines

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Aim: The aim of the study was to assess our current practice against standard national guidelines using the Joint British Diabetes Societies for inpatient care (JBDS) 2012, updated 2022 guidelines and identify areas for improvement.
Methods: A retrospective study, collecting data from patients coded for 'hyperosmolality'; 'diabetes' and recording the agreed variables on excel sheet. Data analysed and results collated. 34 out of 53 cases met the criteria. We reviewed their admission documents, insulin prescription charts, fluid charts and all other relevant medical records.
Results: Our data showed equal distribution in gender, with age distribution between 54 to 93 years. Nearly all patients had type 2 diabetes of varying duration; 3 patients presented with HHS as an initial presentation of their diabetes. 41% of patients were already treated with insulin, while 35% were on oral hypoglycaemic agents with an even smaller number on both. As expected, the most common cause of HHS was infection and sepsis, while the most common complication was dehydration and acute kidney injury. The mortality rate of HHS in our study was 9%, slightly better than the national average mortality of 10%–20%.
Conclusion: Our practice is mostly in line with national standards; however, arears we could improve on include early commencement of long-acting insulin in naïve patients, foot care and appropriate fluid management. We suggested a quality improvement project to include dedicated foot care section within the trust's HHS management proformer and also education of healthcare practitioners. With this, we hope to improve patient outcomes and plan a re-audit in 1 year.

Clinical care and other categories posters: Case reports

P115 | Apomorphine-induced hyperglycaemia in a patient with diabetes and advanced Parkinson's disease

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A 75-year-old man with Parkinson's disease (PD) and well-controlled type 2 diabetes (HbA1c 47 mmol/mol) was admitted for initiation on an apomorphine pump. Initially, his blood sugars were stable between 6 and 11 mmol/L on 40 units of Lantus once a day. Twenty days after the Apomorphine was started, the patient was consistently hyperglycaemic with blood sugars above 12 mmol/L, climbing into the twenties. Apomorphine was the only novel medication, and his nutritional intake remained unchanged. Novorapid was added to his insulin

regime to manage this new variability. Daily medication on discharge was four units Novorapid with meals and Lantus 36 units. His HbA1c after this 3-month admission was 52 mmol/mol.

Apomorphine is a dopamine receptor agonist, used to manage fluctuating 'off' motor symptoms of dopamine-therapy in PD. The BNF does not caution Apomorphine's use in people with diabetes, though hyperglycaemia was a suggested side-effect in animal studies in 1975. While there is evidence that this effect can occur in humans, it has not been recognised in formal trials. Dopaminergic activity of Apomorphine is postulated to affect both insulin secretion and resistance.

As the prevalence of both diabetes and PD increases, the effects of Apomorphine on blood sugar must be better anticipated. Clinicians and pharmacists should consider informing patients of this potential side effect, much as they would for steroids and antipsychotics. This case demonstrates a 20% rise in daily insulin requirement and a rise in HbA1c of 5 mmol/mol.

P116 | Transforming lives through technology: A case study

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Background: Hypoglycaemic episodes and impaired awareness of hypoglycaemia can have significant physical and psychological impacts on people with diabetes. Continuous glucose monitoring (CGM) is a recognised treatment to prevent hypoglycaemic episodes. CGM devices can provide alerts that warn of impending hypoglycaemia so that treatment can be instigated before a more severe attack.

Case: We present a case of a female patient, diagnosed with type 1 diabetes at the age of 14. She developed impaired awareness of hypoglycaemia during two pregnancies between the ages of 25 and 27. By the age of 36, the frequency of hypoglycaemic attacks requiring third party assistance, with need for glucagon injections, was four times per week and she had developed absent hypoglycaemic awareness. There was particular concern for her safety when she was left alone for hours during the daytime. There were a number of psychological barriers which prevented her from engaging with hypoglycaemia awareness education programs and technology including agoraphobia and a fear of technology. Aged 48, she attended the technology clinic and was seen jointly with a psychologist. She was started on a Dexcom G6 and after a few months of transition, did not experience a severe hypoglycaemic episode for over a year. Furthermore, HbA1c improved from 76 to 60 mmol/mol.

Conclusion: This case demonstrates the impact that CGM can have to markedly reduce the frequency and severity of hypoglycaemic episodes. The introduction of CGM transformed her life with physical and psychological health benefits.

P117 | Diabetes in Kabuki syndrome (KS) 1 on a background of post-transplant diabetes mellitus (PTDM)

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KS is a genetic disorder characterised by distinctive facial features, developmental delay, and multisystem congenital anomalies. Endocrine complications such as premature thelarche and short stature are common whereas disorders of glycaemic control are less frequent. We describe the case of a 23-year-old Caucasian female who was referred to the diabetes clinic for hyperglycaemia during haemodialysis. She was diagnosed with Kabuki syndrome based on characteristic clinical features, which was confirmed by detecting a heterozygous pathogenic variant in KMT2D. She was known to have multiple congenital anomalies at birth, including complex congenital heart disease and a single dysplastic ectopic kidney, and received a cadaveric transplanted kidney at the age of 13 years. She had hyperglycaemia consistent with PTDM and was started on insulin. Examination at the time revealed truncal obesity. She developed acute graft rejection and graft failure 14 months post-transplant and she started haemodialysis. Her blood glucose levels normalised post-graft explant, but she was hyperglycaemic again during dialysis at age 23 years. Given her clinical phenotype, negative diabetes antibodies and normal pancreas on ultrasound, she was diagnosed with type 2 diabetes and achieved good glycaemic control with gliclazide.

Acknowledgement: https://edm.bioscientifica.com/view/journals/edm/2024/1/EDM23-0133.xml

P118 | A review of patients within the severe insulin resistance service (NSIRS) with partial lipodystrophy who have undergone metabolic surgery

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Aims: The aim of the study was to review outcome data from the 11 patients with partial lipodystrophy under the NSIR service who have undergone metabolic surgery (2012 to 2023).
Methods: Review of electronic medical notes. Reported averages are Median and range.
Results: We audited charts from 11 female patients with partial lipodystrophy aged 28–70 years (median age: 60). Nine patients underwent Roux-en-Y gastric bypass and two patients sleeve gastrectomy via a tier four NHS service between 2012 and 2022 (Median Follow-up (years): three [1–11]). Five required exceptional funding as did not meet the current NICE criteria for surgery. BMI pre-surgery ranged from 26.9 to 42.6 kg/m^2 (median BMI pre-surgery: 35.24 kg/m^2). Following surgery, the median percentage weight loss was 23.4% (range: 5.5%–40.75%). Of the 10 patients treated with insulin therapy pre-surgery, four stopped insulin and five significantly reduced their dose (median insulin dose (units) pre-surgery: 311[119–500], post-surgery: 59[25–660]) Despite cessation or reduction in diabetes treatment HbA1c levels improved markedly following surgery (median HbA1c (mmol/mol) pre-surgery: 89[45–118], post-surgery: 53[30–84]). Similarly, triglycerides improved post-surgery (median triglycerides (mmol/L) pre-surgery: 3.00 [1.6–29.9], post-surgery: 1.74 [1.4–2.72]). Unfortunately, two patients experienced complications with one patient requiring long term artificial feeding. All patients continued on metformin.
Conclusion: Our patient review suggests that metabolic surgery can be an effective treatment for familial partial lipodystrophy. However, the risk of long-term complications from metabolic surgery and limited evidence base highlight the need for careful patient selection and care within a highly specialised service.

P119 | Motivational techniques combined with unconventional medications and technology improving care in a disengaged patient with type 1 diabetes: A case study of a success story

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A 42-year-old lady with complex diabetes was diagnosed age 19 years. She went on an insulin pump (Medtronic Minimed), Hba1c was 56 mmol/mol which crept up to 72 mmol/mol. She developed hypertension, nephropathy and laser treated retinopathy. Starting Freestyle Libre with Medtronic640 improved Hba1c down to 52 mmol/mol.
Her social and financial circumstances, including being a single mum, deteriorated leading to diabetes distress and burnout. Healthcare and diabetes management became a burden. Ambulatory glucose profile (AGP) showed time in range (TIR) 28%, high (H) 23%, very high (VH) 42% and Hba1c71 mmol/mol. Counselling and motivational interviewing with regular support was provided. She had stopped all medications and insisted on a pump break. Hba1c increased to 118 mmol/mol, TIR14%, H5%, VH81%, mean glucose (MG) 23.3 mmol/L. She wanted to restart the pump and it was felt on previous pump therapy she had safer glucose levels and no ketoacidosis. AGP improved with TIR29%, H18%, VH52%, MG15.4 mmol/L in 2 weeks. After 3 months, TIR was 33%, H20% VH42%, Hba1c76 mmol/mol. Weight was increasing with associated diabulimia. Dulaglutide was started after counselling. TIR51%, H16%, VH9%, level 1 hypoglycaemia11%, level 2 hypoglycaemia13%. She started HCL (Medtronic 780G with Guardian G4) and Hba1c was 45 mmol/mol, TIR66%, H18%, VH15%, level 1 hypoglycaemia1%, level 2 hypoglycaemia0%. Her weight has come down from 99 to 82 kg with BMI 31.4 kg/m^2. Renal function has improved (eGFR 33 to 42 mL/min). Quality of life (QOL) assessments show great improvement.
This case highlights a life plan is as important as a health plan. A motivational and supportive approach, advanced technologies and some off-license medication reduced diabetes burden and improved patient engagement.

P120 | Injection sites: Beyond lipohypertrophy

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A 72-year-old Caucasian female was referred to the Community Diabetes Service because of concerns about her insulin injection sites. She was diagnosed at the age of 20 with type 2 diabetes and, after a short trial of chlorpropamide, was started on insulin within a year of diagnosis; her most recent HbA1c was 54 mmol/mol. On review, she was slim with a BMI of 22 kg/m^2 with no signs or investigations to suggest metabolic syndrome. A stimulated c-peptide was 7 pmol/L with a paired glucose of 11.0 mmol/L, and islet autoantibodies (GAD, IA2, ICA, ZnT8) were negative. Her injection sites showed approximately 36, 2–3 cm violaceous lesions on her abdomen and thighs which developed three to 4 weeks after insulin injections. An empirical course of flucloxacillin, co-amoxiclav and doxycycline had been trialled by the GP over several months with little improvement. She was reviewed by dermatology, infectious disease, and allergy teams. This resulted in a course of lymecycline, fusidic acid and steroid creams with no significant improvement. A skin biopsy showed inflammatory infiltrate consistent with an infectious cause. The fungal culture was positive for *Alternaria species*, and she started treatment with Posaconazole. After discussion at a specialist diabetes MDT, her diabetes was reclassified as type 1; she was then fast tracked for an insulin pump and DAFNE training, given ongoing issues with her injection sites. She has not developed any new injection site issues; her HbA1c has remained stable. This case demonstrates the importance of effective interdisciplinary working to explore differential diagnoses, in terms of her skin lesions as well as her diabetes diagnosis.

P121 | Lessons from a teacher: Managing diabetic foot sepsis in the NHS under critical pressure

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A 49-year-old schoolteacher with insulin treated type 2 diabetes attended the diabetic foot clinic. Four days prior he tripped causing a left big toe superficial abrasion. He felt unwell the next day with chills. In MDT clinic, he had normal blood pressure and glucose, temperature 37.2°C, left hallux superficial ulcer, SINBAD score 3, cellulitis on left forefoot, neuropathy, biphasic foot pulses on doppler. The hospital was in critical incident, the patient was compliant but reluctant to come in and a decision for supervised outpatient treatment made with daily phone contact, alternate day attendance with safety netting advice to attend A&E. He was started on CGM (Freestyle Libre), oral co-amoxiclav and ciprofloxacin. Initial abnormal blood tests (WBC 18.7×10^9/L, CRP 210 mg/L, Lactate 2.4 mmol/L, Glucose 10.8 mmol/L) results improved on retesting. Sepsis symptoms were settling. After 4 days, foot doppler signals became monophasic and with tissue necrosis on the hallux though his cellulitis was settling. He was admitted briefly for intravenous antibiotics and urgent MRI angiogram (showed good anterior tibial inflow into foot). The foot is slowly healing, his foot pulse doppler signal has returned to biphasic, but there is an eschar on the left hallux and the toenail has fallen off.
The case highlights the risk of capillaritis in diabetic foot sepsis which can lead to rapid tissue hypoperfusion and necrosis. Doppler signals are unreliable in presence of sepsis and tissue oedema. A virtual ward setup with intravenous antibiotics and rapid diagnostic test access is being developed before the winter bed crisis.

P122 | Alpelisib glucotoxicity: A novel systemic-anticancer treatment (SACT) induced hyperglycaemia

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A 71-year-old patient with HR-positive, HER2-negative metastatic breast cancer previously treated with surgery, chemotherapy and letrozole had somatic cancer panel analysis which returned positive for PIK3CA gene mutation, leading to treatment with Alpelisib, a PIK3CA inhibitor. Alpelisib prolongs progression free survival in PIK3CA mutated cancers, but its commonest side effect is hyperglycaemia, observed in 63% of patients in trials.
Our patient's random blood glucose pretreatment was 5.4 mmol/L, unfortunately HbA1c was not checked. Patient was advised to check blood glucose daily. Within 4 days of initiation, she noted elevated glucose levels of 16 mmol/L. Alpelisib was held, and she was started on metformin which helped bring glucose levels down. Alpelisib was then restarted at half-dose but on uptitration, there was recurrence of glucotoxicity. Diabetes team advised

SGLT2-inhibitors (if ketones negative) or pioglitazone as second line treatment. Addition of empagliflozin led to great results. She continued alpelisib to good effect and even came off empagliflozin later, with stable BG <8.9 on metformin.

Conclusion: Alpelisib is a novel SACT which frequently causes hyperglycaemia within 1–2 weeks of initiation because PIK3CA inhibition blocks the metabolic action of insulin. Fasting glucose and HbA1c are needed for diagnosis and should be checked prior to treatment initiation. Alpelisib glucotoxicity needs a personalised antihyperglycemic regime with metformin as first line and second line agents suggested as DPP-IV inhibitors, SGLT2-inhibitors or pioglitazone. This is contrary to conventional SACT associated hyperglycaemia which is treated with gliclazide and insulin. Insulin secretagogues can have deleterious effect on PIK3CA blockade; therefore, individualised hyperglycaemia treatment is needed.

P123 | Alpelisib induced severe ketoacidosis in a previously undiagnosed patient with diabetes with metastatic breast cancer

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A 72-year-old lady had an emergency hospital admission with episodes of generalised seizure and reduced consciousness. CT brain was unremarkable. Initial blood tests showed glucose 36.5 mmol/L, ketone 7.7 mmol/L, pH 7.062, bicarbonate 8.9 mmol/L, lactate 5.7 and anion gap 40.3. A diagnosis of severe diabetic ketoacidosis (DKA) was made, and she was started on intravenous insulin infusion and fluids as per hospital policy. Patient made full recovery from DKA. She was not known to have diabetes previously but had metastatic breast cancer which had progressed on endocrine therapy. Two weeks before this admission, she had been started on alpelisib (alpha selective phosphatidylinositol 3 kinase inhibitor) with fulvestrant (anti-oestrogen). Alpelisib (PI3K inhibitor) is used in hormone receptor (HR) positive, human epidermal growth factor receptor 2 (HER-2) negative and PIK3CA gene mutated breast cancer that has made progression on endocrine treatment. In SOLAR-1 randomised control trial, the most frequently occurring adverse effect of alpelisib was found to be hyperglycaemia. Alpelisib reduces glucose uptake into skeletal muscle and adipose tissue and induces glycogenolysis in the liver. Fasting blood glucose and HbA1C should be checked before commencing alpelisib, and they should also be monitored regularly during treatment. For hyperglycaemia in such cases, alpelisib dose can be adjusted and anti-diabetic medications can be used depending on adverse effect severity. In case of our patient, alpelisib was stopped completely and she was started on insulin on specialist advice. Her HbA1c improved from 82 to 65 mmol/mol in 3 weeks after stopping alpelisib.

P124 | Discrepancies of glycated haemoglobin (HbA1c) and actual glucose: A case series with clinical scenarios

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Introduction: HbA1c is a useful measure of glycaemic control over the preceding 3 months with an emphasis on preceding 30 days. We present four clinical scenarios that affect its reliability.

Case 1: Twenty-nine-year-old female started on Dapsone for hidradenitis suppurativa. Pre-dapsone HbA1c was 38 mmol/mol and 2 years post-dapsone HbA1c <18 mmol/mol, normal fructosamine 272 μmol/L (211–328), glucose-6-phosphate dehydrogenase (G6PD) activity 12.9 IU/gHb (8.8–12.8), methaemoglobin 8.6% (0–1.5) and reticulocyte 6.5% (0.5–2.5) indicating haemolysis.

Case 2: Forty-nine-year-old female with type 1 diabetes and rheumatoid arthritis started on sulfasalazine. HbA1c dropped from 65 to 30 mmol/mol, fructosamine 415 μmol/L (211–328), mildly raised reticulocyte 2.6%, haemoglobin 128 g/L (115–165) indicating mild haemolysis.

Case 3: Fifty-nine-year-old male with type 2 diabetes and genetic haemochromatosis (C282Y homozygous) started venesection. HbA1c prior was 63 mmol/mol reduced to 29 mmol/mol, fructosamine 262 μmol/L and c-peptide 2760 pmol/L indicate good beta cell reserve.

Case 4: Seventy-year-old female with Graves' disease, post-radioiodine hypothyroidism, HbA1c <20 mmol/mol (was 41 mmol/mol 2 years ago) as part of annual hypertension screen. Fasting glucose 6.0 mmol/L, low haemoglobin 102 g/L, high reticulocytes 9.5%, direct antiglobulin Coombs test positive indicating low HbA1c due to autoimmune haemolytic anaemia.

Discussion: HbA1c depends on glycation of red blood cells (RBC) and is proportional to ambient glucose concentrations. Conditions that affect RBC lifespan and turnover can alter HbA1c values. Dapsone causes oxidative haemolysis as can sulfasalazine. Venesection and haemolytic anaemia shorten life span of red blood cells and duration

of haemoglobin exposed to glucose in the bloodstream resulting in falsely lower HbA1c.

Conclusion: Clinicians must be aware of conditions affecting accuracy of HbA1c and consider alternate tests including venous glucose, fructosamine, capillary glucose or continuous glucose monitoring.

P125 | Revisiting over-the-counter supplements as adjunctive therapy for type 2 diabetes: A new hype?

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A 43-year-old gentleman with poorly controlled type 2 diabetes experienced a significant improvement in his HbA1c and lipids after self-treating with an over-the-counter supplement. As well as diabetes, obesity and non-alcoholic fatty liver disease, he has been battling with depression and anxiety. Despite good compliance with maximum oral medications and Semaglutide, his HbA1c remained high. Insulin is not an option, due to severe allergic skin reactions to insulin preparations. He reported his mental health issues limited his ability to make lifestyle changes. It was noted that over the last 18 months, his Hba1c, triglyceride and HDL levels significantly improved, respectively, decreasing from 103 to 66 mmol/mol, 7.3 to 2.3 mmol/L, and 0.8 to 1.0 mmol/L. He reported this coincided with him starting the over counter supplement Berberine, in addition to usual treatment. He is aware that it is an unlicensed supplement but has not experienced any side effects, and his renal functions and liver enzymes have been stable in normal range.

Berberine has been used in herbal Chinese medicine. There has been emerging evidence supporting clinical efficacy in lowering blood glucose level via activation of AMPK pathway, increasing GLUT1 and GLUT4 translocation to induce glycolysis. Its role as glucose lowering agent is promising, but clinical studies remain conflicting. His decision to independently explore additional options may reflect an increased feeling of empowerment in managing his diabetes that could have contributed, even though he denies any significant other lifestyle changes. In this case, with limited treatment options, berberine has had significant effects.

P126 | Extra glycaemic effects of sodium-glucose cotransporter 2 inhibitors (SGLT2i) in the management of refractory hypomagnesemia in patients with or without diabetes

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Introduction: Hypomagnesemia can occur with type 1 and 2 diabetes with prevalence of 2.9% and 10%–48% respectively. SGLT2i have been shown to improve serum magnesium levels with several different mechanisms of action. We report that two cases of refractory hypomagnesemia were successfully treated with SGTL2 inhibitor.

Case report: Case 1: A 35-year-old lady background history of osteosarcoma treated with cisplatin-based chemotherapy presented with symptomatic refractory hypomagnesemia for 2 years. She also suffered from chemotherapy-induced cardiomyopathy. She was commenced on magnesium aspartate sachets twice a day due to symptomatic hypomagnesemia with the lowest level of 0.4 (0.85–1.10 mmol/L) and required monthly magnesium infusions. After renal and gastrointestinal magnesium loss was excluded, Dapagliflozin was commenced. Thereafter, she was improved clinically and biochemically (Magnesium level 0.61 mmol/L) and had no requirement of magnesium infusion for almost 10 months.

Case 2: A 42-year-old lady with a background history of type 1 diabetes had refractory hypomagnesemia (0.45 mmol/L) for years. Despite being on four sachets of oral magnesium daily, she required 2–4 weekly magnesium infusions to keep her magnesium levels above 0.50 mmol/L. There were no medications identified contributing to her hypomagnesemia. Dapagliflozin commenced cautiously as she has type 1 diabetes. Subsequently, the magnesium level has remained stable (0.51–0.60 mmol/L) and magnesium infusion has not been required for the last 6 months.

Conclusion: SGLT-2 inhibitors have known renal tubular effects, which can be utilised in patients with refractory hypomagnesemia to reduce or eliminate the need for magnesium infusion.

P127 | The effects of a glucagon-like peptide-1 receptor agonist on a person with type 1 diabetes and disordered eating (T1DE): A case report from a patient's narrative

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We present the case of a 61-year-old woman with type 1 diabetes and a self-reported history of disordered eating thoughts and behaviours, who was interviewed as part of a wider study on communication and T1DE. Diagnosed with type 1 diabetes at age 12, she started experiencing disordered thoughts about food in her teens. She restricted insulin for several years and abused laxatives for many years after ceasing insulin restriction. She described cycles of dieting and bingeing since diagnosis, and weight loss and gain accompanied by significant emotional distress. She identifies herself as having T1DE but has not disclosed this to diabetes healthcare professionals. Some months prior to the interview, she was prescribed a glucagon-like peptide-1 receptor agonist (GLP-1) for weight loss. She reported a resulting weight loss of around 19 kg and improved self-esteem. Despite struggling with T1DE her whole adult life, she reported not engaging in disordered eating behaviours since commencing the GLP-1 treatment, with a cessation in her desire to binge eat. However, she continues to express concern about gaining weight and disordered thoughts around food. There is a dearth of GLP-1 studies including people with T1DE, and their use is contraindicated in the Royal College of Psychiatrists Guidance on Recognising and Managing Medical Emergencies in Eating Disorders. However, our participant's lived experience with GLP-1 treatment suggests benefits to her T1DE, and wider health, with limitations. Further research is required to understand the effects and form an evidence base regarding the use of GLP-1s in people with T1DE.

P128 | A young lady with diabetic mastopathy (DMP): A less well-known complication of diabetes

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Refer to Oral number A15.

P129 | Euglycaemic diabetic ketoacidosis (DKA) in a woman with gestational diabetes

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This case involves a 38-year-old woman who developed DKA on two previous pregnancies despite not having diabetes outside of pregnancy. In her third pregnancy, she presented at 24-weeks of gestation with sepsis, glucose >30 mmol/L, ketones >7 mmol/L, pH 7.11, and was treated in intensive care (ICU). A perimortem caesarean-section was performed, with stillbirth. Diabetes antibodies were normal, and c-peptide showed substantial endogenous insulin production. Risk factors for gestational diabetes (GDM) included Black-African ethnicity and BMI 46.7 kg/m^2. No previous GDM. Following DKA resolution, she was started on subcutaneous insulin, which was then discontinued while she was still in hospital with normal glucose readings. In her fourth pregnancy, her HbA1c was 43 mmol/mol at 10-weeks and was managed as GDM with metformin and basal-insulin. She presented at 30-weeks with dyspnoea and vomiting. She was found to have euglycaemic ketoacidosis (pH 7.09, ketones >7 mmol/L, HCO3: 4.5 mEq/L, glucose 9.4 mmol/L, HbA1c 40 mmol/mol). No precipitating factor was noted except for suboptimal adherence to treatment. She was managed in ICU. c-peptide levels were 1774 pmol/L and diabetes antibodies were normal. She was discharged on basal-bolus insulin. Undergoing steroids for fetal lung maturation, she required variable rate IV insulin with close monitoring and had a planned birth at 36 weeks. Insulin was stopped post-birth and her glucose remained normal. Pregnancy is a ketogenic state. DKA carries high risk of fetal demise. DKA should be considered in any pregnant woman presenting unwell, even if she does not have known diabetes and glucose level is normal.

P130 | Linezolid precipitating lactic acidosis in an elderly: A novel complication in diabetic foot ulcer

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Refer to Oral number A18.

P131 | Euglycaemic ketoacidosis: Rare, atypical but serious complication of sodium-glucose co-transporter-2 (SGLT2) inhibitors

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Refer to Oral number A14.

P132 | Lipoatrophy caused by analogue insulin via continuous subcutaneous insulin infusion (CSII): A rare but challenging problem

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Refer to Oral number A17.

P133 | Killing two birds with one stone: Off-target benefits of infliximab for colitis on type 1 diabetes

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Refer to Oral number A13.

P134 | An unusual case of sustained insulin independence despite positive autoantibody titres in a patient with diabetes: A case report

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Refer to Oral number A16.

Clinical care and other categories posters: Case reports: Covid-19

P135 | Covid-19: A potential cause of beta cell dysfunction?

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Introduction: Covid-19 has been shown to induce hyperglycaemic states, both in those with and without pre-existing diabetes. However, the mechanism, long-term sequelae and true prevalence of Covid-19-induced diabetes remain uncertain. Here, we present two cases relating to this phenomenon.

Case 1: A 48-year-old previously fit man contracted Covid-19 in late 2021 and subsequently lost 7.5 kg in weight, falling to 62 kg. In March 2022, he presented to the hospital with non-ketotic hyperglycaemia and a HbA1c of 107 mmol/mol. He was subsequently treated with glargine and mealtime insulin aspart. HbA1c subsequently fell to 51 mmol/mol in October 2022 and has since remained on target. His weight has since increased to 68 kg (BMI 25).

Case 2: A 67-year-old woman, positive for Covid-19, presented to the hospital in July 2022 with osmotic symptoms along with pyrexia, exhaustion and a dry cough. HbA1c was measured at 146 mmol/mol without ketonuria. On CT pancreas, no abnormalities were detected. She was subsequently started on Humulin M3 and metformin. By November 2022, HbA1c had fallen to 34 mmol/mol, with recurrent hypoglycaemia. At that point, the insulin was stopped. HbA1c remained low, recorded at 36 mmol/mol

in May 2023. Her most recent HbA1c was 39 mmol/mol, while off all oral hypoglycaemics. Her weight remains stable at 103 kg (BMI 38).

Conclusion: These cases add to the accumulating evidence implicating Covid-19 in some cases of new-onset diabetes. Going forward, we aim to monitor beta cell function and insulin resistance in these individuals to define the long-term effects of Covid-19 on glucose control.

Clinical care and other categories posters: Children, adolescence and young adults

P136 | Engaging the disengaged and in danger: Emergency admission follow-up in a young adult diabetes service

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Introduction: The time of transition for a young adult with diabetes is a challenging time and many different factors can contribute towards difficulties in managing their diabetes.

The same challenges can result in reduced engagement with their secondary care diabetes teams, and subsequently they can miss out on additional support when needed most, including consideration of new technologies to support them in their diabetes management.

Aim: The aim of the study was to identify young adults within out area who have been admitted to hospital with a DKA in the past year, in order to offer them face to face support irrespective of their previous levels of engagement.

Method: Fifteen patients were admitted with DKA and one patient admitted with a severe hypoglycaemia to MWL Acute Trust between April 2022 and April 2023.

Appointments via letter and follow-up phone call were provided to all patients within our catchments and GP letters sent to those external to the trust.

Results: Sixteen patients identified, with median HbA1c 116, eight patients were using flash/CGM monitoring, and all patients known to the department had a history of previous non-attendance. Three patients were out of the area. Eight patients subsequently attended, five did not. Dramatic improvement in HbA1c was seen in four patients, one patient engaged with clinical psychology, three patients began process of commencing a pump and one patient upgraded to Hybrid closed loop.

Conclusion: It is never too late to engage with our young adult population and improvements can be made, but there is still those that we cannot reach, for which we may need to think outside the box.

Acknowledgement: MWL Young Adult Diabetes Service.

P137 NAH | Letting the young adult take the lead: Implementation of a questionnaire enabling young adults with diabetes guide the direction of their consultation

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Introduction: Engagement in young adult services for patients with diabetes is a well-known challenge, by enabling our young adults to guide their consultation we hope to improve this, by producing a more personal patient experience.

Aim: The aim of the study was to ensure the consultation focuses on what is most important to the young adult with diabetes.

Method: A questionnaire was designed to include a range of topics to choose from relevant to young adults with diabetes. These are given out prior to seeing a clinician at the stage of performing the HbA1c. The questionnaire is then used to guide the conversation within the consultation. We then collated and analysed the anonymous questionnaires to see what is most frequently requested, data collected 2022–2023.

Results: 74% of questionnaires were filled in, with the most frequent selected topic being CMG/flash monitoring at 26%. Other highly requested topics include food and diet (17%), mental health and wellbeing (17%), weight loss (16%), travel and holidays (11%), fluctuant blood sugars (12%), hypoglycaemia (10%) and job issues (10%).

Actions: With these data, we have implement use of the CORE 10 mental health questionnaire to further investigate the wellbeing of our young adults, we have also designed a satisfaction questionnaire to analyse their thoughts and feelings about the service.

Conclusion: Our main focus is making the service work for our young adults, to encourage engagement and hopefully improve outcomes. The use of this questionnaire hopefully makes our young adults feel listened to and helps them take charge of their consultation and subsequently their diabetes care.

P138 | Understanding how to involve young adults living with diabetes, aged 18–30 years, in diabetes research

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Background and Aims: Young adults living with diabetes are particularly underrepresented in clinical trials for diabetes, where they potentially have the most benefit to gain from these interventions because of the long journey with diabetes ahead of them.
Our aim was to involve young adults in research, prioritise their input in setting diabetes research goals, and address outcomes they find most important.
Methods: Through underserved communities funding from the National Institute for Health and care Research (NIHR), we worked alongside young adults to co-design a poster, shared with the diabetes online community and national diabetes services, to recruit young adults to form focus groups. A survey was shared through social media, to determine the awareness and motivations of young adults to participate in research.
Results: Out of 104 survey participants, most expressed interest in learning about diabetes research. Their motivation for research participation included gaining knowledge, building confidence and connecting with others living with diabetes. Some participants from the focus groups subsequently participated in their first diabetes study.
Most focus group participants expressed interest in research but lacked awareness of local or national diabetes studies or had never been offered participation opportunities.
Conclusions: Our findings demonstrate the importance of clinical teams discussing research and research opportunities with young adults living with diabetes. Furthermore, involving individuals with lived experience will enhance researchers' understanding of this age group's priorities and build a network for peer support, potentially increasing patient participation and involvement.

P139 | Seamless transformation of our transition and young adult service

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Introduction: Following RCPCH peer review of our Paediatric Diabetes Service in 2021, concerns were identified regarding the transition and transfer policy at (formerly known as) St Helens & Knowsley NHS Trust for young people with diabetes from ages 16 to 18 years from paediatrics to adult services. Prior to the review our transition service consisted of two handover clinics per year.
Aim: Through involvement with the Seamless Transition Quality Initiative Programme, the paediatric and adult diabetes teams combined forces to develop a transition MDT.
Method: We completed the 9-month Seamless diabetes transition programme, including four phases with learning events and coaching calls. Providing the tools to implement changes to make positive change to our service and patient experience. We started by updating of the transition policy and SOP through combined working. Following this, 12 transition MDT clinics were established, comprising of adult and paediatric doctors and diabetes specialist nurses, dietitians and psychologists. The clinic is designed for patients between the age of 16 and 18 years, to review each young person four times prior to transfer to young adult services. We have initiated service evaluation projects to gather information about patient engagement, service design, education, integrated care and teamwork for ongoing development.
Conclusion: The past year the number of clinics has increased to 15, gained an additional adult diabetes doctor, adjusted the format of the clinics and started using 'Ready, Steady, Go' and 'DigiBete' with great outcomes. These changes are thanks to the skills we gained with the Seamless diabetes transition program.
Acknowledgements: Ms J Brown[2].

P140 | Impact of deprivation on glycaemic outcomes and access to technology in young adults with type 1 diabetes

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Introduction: Data from the national diabetes pump audits show variable uptake of technology in individuals from more socioeconomically deprived backgrounds which may contribute to differential outcomes. The aim of this study is to explore the impact of deprivation in glycaemic outcomes of young adults with type 1 diabetes.
Methods: Data were collected as part of the NHS England Young Adult service pilot; all individuals with known type 1 diabetes in the University Hospitals of Derby and Burton service were included. Descriptive statistics and ANOVA was used to analyse mean HbA1c and the uptake of a range of diabetes technologies across different deprivation quintiles.
Results: In total, 391 individuals were included with mean ± SD age 21.6 ± 2.3 years (range: 17–26 years), diabetes duration 10.3 ± 6.0 years, mean HbA1c 73.4 ± 24.6 mmol/mol ($n = 263$); 55.8% were male, 77.8% were White. The HbA1c in the most deprived quintile (IMD 1) was 78.5 ± 26.3 mmol/mol ($n = 51$) and in the least (IMD 5) was 67.8 ± 20.2 mmol/mol ($n = 54$). There was no statistical difference in HbA1c between any of the quintiles. There was a trend towards greater uptake of technology in least deprived with 8.2% using HCL, 17.6% using pump, 69.4% using flash and 21.4% using CGM compared to 1.3% using HCL, 15.0% using pump, 67.5% using flash and 17.1% using CGM in most deprived.
Conclusion: Lack of statistically significant difference in HbA1c between deprivation groups could be attributed to small sample size. Despite this, the difference in HbA1c remains clinically relevant and the uptake of technology is variable between the groups. Efforts must be made to ensure equitable access to technology with targeted interventions to promote use in those from poorer backgrounds.

P141 | Significance of ethnicity on glycaemic outcomes and access to technology in young adults with type 1 diabetes

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Introduction: Data from national diabetes pump audits show variable uptake of technology in individuals from non-White ethnic backgrounds which may contribute to differential outcomes. The aim of the study is to examine the significance of ethnicity in glycaemic outcomes of young adults with type 1 diabetes.
Methods: Data were collected as part of the NHS England Young Adult service pilot; all individuals with known type 1 diabetes in the University Hospitals of Derby and Burton service were included. Descriptive statistics and ANOVA was used to analyse mean HbA1c and the uptake of a range of diabetes technologies across different ethnicities.
Results: The audit included 391 patients with mean ± SD age 21.6 ± 2.3 (range: 17–26), diabetes duration 10.3 ± 6.0 years, mean HbA1c 73.4 ± 24.6 mmol/mol ($n = 263$); 55.8% were Male.
Mean HbA1c according to ethnicity: 73.6 ± 23.7 ($n = 200$, White), 73.8 ± 34.0 mmol/mol ($n = 5$, Black), 66.3 ± 21.5 mmol/mol ($n = 10$, Asian), 86.9 ± 41.9 mmol/mol ($n = 8$, Mixed), 59.2 ± 19.2 mmol/mol ($n = 13$, Other), 76.9 ± 24.7 mmol/mol ($n = 27$, Unknown). There was no statistical difference in HbA1c between any of the ethnicities. Percentage of HCL users per ethnicity: 4.0%(White), 0% (Black), 0% (Asian), 0% (Mixed), 5% (Other), 5.9% (Not known). Percentage of stand-alone insulin pump users per ethnicity: 15.5% (White), 0% (Black), 15.4% (Asian), 16.7% (Mixed), 10% (Other), 31.4% (Unknown). Percentage of continuous glucose monitoring (CGM) users per ethnicity: 83.6% (White), 61.2% (non-White).
Conclusion: Although there is no statistically significant difference between HbA1c between different ethnicities, uptake of technology is more variable. There is no uptake of pump and HCL in YA from Black backgrounds, and there is no HCL uptake locally among Asian or Mixed ethnicity young adults. CGM use is lower among non-White ethnic groups. Equitable access to diabetes technology must be a focus of care moving forwards to improve uptake in these groups.

P142 | Barts Health (BH) high-risk young adult diabetes (YAD) pathway-improving engagement in a vulnerable patient cohort

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Background: Mile End YAD clinic serves a vulnerable diabetes population with 35% of the clinic deemed high risk-HbA1c >100 mmol/mol/non-attendance/multiple DKA admissions/eating disorder/co-existing mental health. We have developed a high-risk YAD pathway that integrates medical, psychological and social services to engage these young people (16–25 years). Led by a YA DSN, youth worker and social prescriber, and supported by a high-risk YAD MDT, young people are supported based on individual need with focus on building trust, safeguarding and minimising financial and social barriers, making healthcare more accessible.
Aim: The aim of the study was to assess initial impact of high-risk YAD pathway on engagement with healthcare since implementation in April 2023.
Methods: Analysis of DNA rates, completion of structured education, DKA and ITU admissions and number of people attending appointments after disengagement in Mile End Hospital (MEH) YAD clinic and Royal London Hospital (RLH).
Results: Clinic Demographics: Total = 103; non-White = 80% (83/103) Deprivation IMD1&2 = 70% (72/103). DNA rates: 36% (9 DNAs/25 Appointments) January–March 2023; improved to 6% (3/47) July–September 2023. Completion of structured education: April 2023 14% (9/63) of T1 clinic population completed structured education; 33% (25/76) had completed by September 2023. Admissions: 13 DKA admissions +3 ITU admissions at RLH November 2022–March 2023; 15 DKA admissions +0 ITU admission April–August 2023. Eight young people newly engaged and attending clinic between April and September 2023.
Conclusions: Initial results show BH high-risk YAD pathway has improved attendance, improved uptake of diabetes education and reduced DKA ITU admissions.
Acknowledgement: Barts Health Young Adult Diabetes Team.

P143 | Type 1 diabetes and school exclusions

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Aims: Type 1 diabetes is most commonly diagnosed aged 10–14 years. The impact of diagnosis and increased daily demands may adversely affect an individual's schooling. The aim of this study was to quantify the relationship between type 1 diabetes and school exclusions.
Methods: Education data sets were linked to the Brecon Cohort, a national diabetes data set. All Welsh school children between 2013 and 2016 were included. Of these 586,693 individuals, 2080 (0.35%) had type 1 diabetes.
Results: In total, 18.1% ($n = 106{,}284$) of children were of lower socioeconomic status (SES, defined by free school meals), 1.8% ($n = 10{,}665$) had a Special Educational Needs (SEN) statement and 2.9% ($n = 17{,}206$) were excluded. The rates of children with lower SES were similar across diabetes status, but children with diabetes were more likely to have a SEN statement (2.8% vs 1.8%, OR 1.6, $p = 0.001$). There was no difference in exclusions between children with or without diabetes (OR 0.99, $p = 0.96$). Lower SES was associated with increased exclusion, and this effect was larger for children with diabetes (OR 6.1, $p < 0.001$) than without (OR 3.9, $p < 0.001$). Children with a SEN statement were also more likely to be excluded (OR 4.5, $p < 0.001$), regardless of diabetes status.
Summary: Type 1 diabetes alone was not associated with school exclusion. Children with type 1 diabetes who were of lower SES or had a SEN statement were more likely to be excluded. Interventions to improve long-term health and socioeconomic outcomes in children with type 1 diabetes should target these at-risk groups.

P144 | Reducing health inequalities and addressing equitable access to treatment technology in children and young people (CYP) with type 1 diabetes

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Aims: The aim of the study was to improve equity of access to diabetes treatment technology at two hospitals in Cheshire and Merseyside (C&M).
Methods: CYP living in the most deprived areas have higher average HbA1c levels and lower usage of technologies such as continuous glucose monitoring (CGM), insulin pump, hybrid closed loop (HCL). Arrowe Park and Warrington Hospitals in C&M were funded by an NHS England project to support the initiative. The project was delivered by paediatric diabetes multidisciplinary teams (MDT) by working additional hours from November 2022 to June 2023. Patients and families were invited for technology awareness sessions for education and training. Patients were then provided with technology group starts, one to one sessions, flexible evening and weekend clinics, telephone reviews and dedicated follow-up appointments. Patient feedback was obtained and outcomes (HbA1c and time in range) are being monitored on ongoing basis.
Results: *Arrowe Park*: 111 patients started on new technology (56 CGM alone, 8 pump alone, 49 both pump and CGM, 38 HCL). 65% of these 111 patients were from lowest 2 deprived quintiles (74% pump starts, 74% HCL starts and 64% CGM starts).
Warrington and Halton: 73 patients started on new technology (6 pumps, 52 CGM, 15 HCL). 42.4% of patients were from areas with deprivation index <5 and 22% of the 73 patients were from most deprived area.
Outcomes data are being continuously monitored to see impact of technology usage.
Conclusions: Both sites succeeded in increasing technology uptake in deprived CYP through this targeted project.

Clinical care and other categories posters: Covid-19

P145 | Association of polypharmacy and burden of comorbidities on Covid-19 adverse outcomes in people with type 1 or 2 diabetes

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Introduction: It is widely accepted that the higher the number of medications taken by an individual, the higher the risk of poor health outcomes. We investigated whether polypharmacy and comorbidities conveyed a higher risk of adverse health outcomes following Covid-19 infection in people with type 1 or 2 diabetes.
Materials and Methods: Baseline demographic information, hospital admission or death within 28 days of infection were extracted from The Greater Manchester Care Record (GMCR) for adults diagnosed with type 1 or 2 diabetes. The Greater Manchester Care Record (GMCR) is an integrated database of electronic health records containing data collected from 499 general practices in Greater Manchester.
Results: For type 2 diabetes, 16–20 medications ($p = 0.005$; OR [95% CI] = 2.375 [1.306–4.319]) and >20 medications ($p < 0.001$; OR [95% CI] = 3.141 [1.755–5.621]) were associated with increased risk of death following Covid-19 infection. Increased risk of hospital admissions in these individuals was associated with 11–15 medications ($p = 0.013$; OR [95% CI] = 1.341 [1.063–1.692]) and above. This was independent of comorbidities, metabolic and demographic factors. For patients with type 1 diabetes, there was no association of polypharmacy with hospital admission. Respiratory, cardiovascular/cerebrovascular and gastrointestinal conditions were associated with an increased risk of hospital admissions and deaths in those with type 2 diabetes ($p > 0.001$).
Conclusion: We have shown that in Type 2 diabetes, an independent association between the number of medications taken from 11 upwards with adverse health

consequences following Covid-19 infection exists. This study has laid the foundation for future investigations into the way that complex pharmacological interactions may influence outcomes in people with type 2 diabetes.

Clinical care and other categories posters: Diet, obesity, exercise and inflammation

P146 | Lifestyle intervention for prevention of progression to type 2 diabetes in adults with prediabetes: A systematic review and meta-analysis of randomised controlled trials

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Objectives: The systematic review and meta-analysis were to assess the effects of diet and/or physical activity on the prevention or delay of type 2 diabetes in adults with prediabetes.
Methods: Studies were systematically searched from three databases, supplemented by manual screening of the reference lists of past reviews. The date of the last search of the databases was 2 March 2021. Randomised controlled trials with a duration of a minimum 6-month intervention and 2-year follow-up were included.
Results: Nine studies were identified for the meta-analysis, with a total of 4918 participants. Follow-up ranged from 2 to 5 years. In comparison with usual care, lifestyle interventions decreased the risk of the development of type 2 diabetes by 27% (risk ratio (RR) 0.73, 95% CI 0.62–0.86, $p < 0.0001$; $I^2 = 0.0\%$, $p = 0.778$) at an average of 2.9 years of follow-up. Mean weight was reduced by 0.78 kg after an average of 2.4 years of follow-up (95% CI −1.53 to −0.03, $p = 0.041$) and mean body mass index (BMI) was reduced by 0.51 kg/m^2 after an average of 2 years of follow-up (95% CI −0.69 to −0.33, $p < 0.0001$). There is no statistically significant difference in reversion to normoglycaemia between lifestyle intervention and usual care (RR 1.14, 95% CI 0.86–1.52, $p = 0.363$; $I^2 = 49.6\%$, $p = 0.114$).
Conclusions: There is evidence that lifestyle modification by a healthy diet and/or regular physical activities could prevent or delay the development of type 2 diabetes in adults with prediabetes.

P147 | Counting the lifetime cost of obesity vs costs of treatment: Analysis based on national England data

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Introduction: Obesity has a significant impact on all-cause mortality rate and overall healthcare resource use (HCRU). These outcomes are also strongly linked to age, sex and local deprivation. We aimed to establish the lifetime costs of obesity by demographic group.
Methods: Population and expected mortality rates by age, sex and deprivation were obtained from national data. Obesity class prevalence was taken from the health of nation study. The published impact of obesity by age, group, sex and deprivation on mortality and HCRU were applied to estimate life years lost and Lifetime HCRU.
Results: Prevalence: 28% of the total adult population had a BMI ≥30 and 12% had a BMI ≥40. 35% of those with a BMI ≥40 were in the top deprivation quintile. Future life years lost: we estimated 2.5 years were lost in people with BMI 30–39.9 6.7 years when BMI ≥40. For those aged 16–49 years with a BMI ≥40, 8.3 years were lost. HCRU: For weight reduction, the annual HCRU decrease in going from BMI ≥40 to BMI 30–39.9 was £342 per person and going from BMI 30–39.9 to BMI 25–29.9 the reduction was £316/person. However, lifetime costs are similar because of reduced life expectancy for obese individuals. Quality Adjusted Life Years (QALY):Overall, 791,689 future life years lost (13.1% of all) in people with BMI ≥25 due to early death were related to excess weight. When the NICE £30,000 per QALY value was applied then the potential QALY value reduction lost was equivalent to £522/person in the obese population and £2864 in the morbidly obese population. The impact of obesity on QOL (utility factor) for those living must also be considered.
Conclusion: For morbidly obese men and women the potential QALY value lost due to early death was £2864/person/year with the potential for these funds to be applied to weight management programmes.

P148 | Dietary choice, uptake and outcomes of a remote 12-month weight management programme delivered to an ethnically diverse population living with type 2 diabetes

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Aims: The aim of the study was to evaluate the uptake and outcomes of dietary approaches (Total Diet Replacement (TDR), low carbohydrate (LC) and 5:2 diets) delivered remotely in ethnically diverse adults with type 2 diabetes. Participants were allocated to groups or 1:1 but chose their dietary intervention.
Methods: Data from adults with type 2 diabetes following a 12-month digitally enabled and remote weight management programme were analysed. All participants had access to an app for self-monitoring. Coach support was provided.
Results: 38.7% ($n=48$) chose TDR, 39.5% ($n=49$) chose LC and 20% ($n=25$) chose 5:2. Black African and Black Caribbean participants mirrored these choices, while more Asian participants preferred the 5:2 diet. Mean weight change at month 12 (m12) was −7.3 kg (−6.7% ($n=23$)) in TDR, −4.9 kg (−4.5% ($n=21$)) in LC, −2.3 kg (−2.8% ($n=10$)) in 5:2. Black African and Black Caribbean participants had an average m12 weight loss of −9.4 kg. TDR, mean month 6 (m6) HbA1c change was −10.3 mmol/mol ($n=23$) and −5.6 mmol/mol ($n=20$) at m12. LC, mean m6 HbA1c change was −9.6 mmol/mol ($n=19$) and −3.2 mmol/mol ($n=22$) at m12. 5:2, mean m6 HbA1c change was −6.8 mmol/mol ($n=10$) and 2.0 mmol/mol ($n=9$) at m12. Lipids improved across the study cohort; the biggest improvement with TDR (−7.7% T-cholesterol and −15.5% in Triglycerides).
Conclusion: A diverse type 2 diabetes population favours TDR and LC as dietary interventions. Greater weight loss (TDR-group) corresponded to more significant improvements in HbA1c, but LC also enhanced glycaemic control despite less weight loss. This highlights the importance of providing patients with choices in their dietary interventions.

P149 | Embracing nutritional data: Exploring the enthusiasm of individuals with type 1 diabetes for nutrition reporting platforms

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Aims: Type 1 diabetes demands active blood glucose management, with Medical Nutrition Therapy (MNT) focusing on carbohydrate counting for insulin dosing. Carbohydrate counting presents challenges due to its complexity and reliance on factors like food labels, macronutrient composition and glycaemic index. Technology could ease this burden in nutrition reporting for type 1 diabetes, but its adoption remains unclear. This study investigates the technology engagement among type 1 diabetes individuals for enhanced disease management, particularly in nutrition reporting.
Methods: Thirty-five type 1 diabetes patients and carers handling carbohydrate counting and insulin dosing were recruited via type 1 diabetes-focused social media platforms. An online questionnaire to assess experiences with nutrition reporting technology and motivators for use. Ethical approval was granted.
Results: Carbohydrate content was determined by previous experience (42.9%) and visual estimates (56%) while food labels (33.3%) and portion weight (38.2%) were also used. Nutrition reporting preferences included meal photos (38.5%) and type/scroll reporting (30.7%). Timing varied, with 55% reporting post-meal. Many found reporting stressful (43.8%), while 37.5% had no strong feelings. Reporting styles included single-word descriptions (42.4%), simple descriptions (23%) and quantifiers (30%).
Conclusion: This study sheds light on the relationship between technology, nutrition reporting and type 1 diabetes management. Nutrition reporting apps have potential, but user engagement and usability issues persist. While carb counting remains central, technology, such as nutrition apps, needs user-friendly, evidence-based design for type 1 diabetes improvement. Research should target barriers and equitable solutions for diverse populations, enhancing the quality of life for type 1 diabetes individuals.

P150 | Personalised management of postprandial glycaemic response in type 1 diabetes

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Aims: This study aims to investigate the uniqueness of postprandial glycaemic responses (PPGR) in people living with type 1 diabetes when exposed to similar meals, providing insights for personalised management and better time spent in the target blood glucose range.
Methods: Data from 12 type 1 diabetes participants, from the Ohio type 1 diabetes data set, using insulin pumps and continuous glucose monitoring were analysed over 8 weeks. PPGR events were grouped based on meal timestamps or bolus insulin administration, and Pearson's Correlation analysis determined PPGR cluster formation. The relationship between carbohydrate content and the number of similar PPGR events was assessed.
Results: The study included 13,870 ± 1062 blood glucose values across 168 mealtimes. PPGR events grouped into set number of PPGR clusters breakfast (4.9 ± 1.1 groups), lunch (5.2 ± 1.8) and dinner (5.6 ± 1.4). An independent Kruskal–Wallis test identified the distribution of carbohydrate intake was the same across all the PPGR clusters formed for each participant and each meal ($p = 0.368$) suggesting the CHO intake alone was not a determining factor for the cluster formation.
Conclusions: PPGRs result from complex interactions involving unique physiology and overall nutrition. Carbohydrate intake and meal timing do not solely determine PPGRs in type 1 diabetes individuals. In a real-world setting, the analysis of PPGRs revealed the emergence of a limited number of PPGR clusters, suggesting the potential for grouping PPGRs based on specific identifiers or tags. Leveraging this categorisation approach holds promise for optimising blood glucose prediction and refining treatment plans, ultimately leading to an increase in time spent within the desired glucose range.

Clinical care and other categories posters: Early detection and prevention

P151 NAH | Mediterranean diet in the postnatal period to prevent type 2 diabetes in women with gestational diabetes: A UK mixed method single-arm feasibility study (MERIT)

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Aims: The aim of the MERIT study was to pilot the trial design and study processes and assess the feasibility of a large-scale trial on the effectiveness of a Mediterranean-style diet in postnatal period for type 2 diabetes prevention in women with gestational diabetes in pregnancy.
Methods: MERIT is a single arm feasibility study with qualitative evaluation. Pregnant women were recruited in the antenatal period in an inner-city London NHS Trust.
Results: A total of 69% (83/121) of eligible multi-ethnic women agreed to participate and 67% (56/83) of those initially recruited commenced the intervention. The last visit (12 months postnatally) was completed by 73.2% (41/56) of participants. A higher number of participants completed visit 2 (which is at 6 months postnatally) 80.4% (45/56). Participants had high engagement with the coach, both face-to-face and via phone-calls or text messages. Adherence based on the ESTEEM diet questionnaire was high at the end of the study. There was a trend of reduction of total dysglycaemia, and the participants weight was also reduced by 1.3 kg, from visit 1 (6 to 13 weeks) to visit 3 (12 months postnatally). Clinical effectiveness discussion is exploratory due to the small sample size. The intervention and trial processes were acceptable to women and healthcare professionals, adherence was high when women had a supportive environment, provided by their family and the health coach.

Conclusions: It is feasible and acceptable to recruit women in the postnatal period in studies that are focused on type 2 diabetes prevention and introduce a dietary intervention.

Acknowledgement: Barts research team.

P152 | The diagnosis and management of prediabetes: The patient's perspective

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Aims: There is a paucity of evidence on how patients interpret and internalise a prediabetes diagnosis and how this influences their everyday lifestyle choices. The aim of qualitative study was to understand the impact of prediabetes from a patient's perspective.

Methods: An in-depth qualitative study of 25 people with prediabetes including narrative interviews, cultural probe exercise (collecting observational data) and follow-up reflective interviews. A thematic and theoretical analysis was undertaken using Bourdieu's theory of practice.

Results: Participants with prediabetes accepted and understood the prediabetes diagnosis but discussed difficulties in lifestyle change, particularly if their social–cultural backgrounds didn't align with health promotion messages from interventions and primary care teams. Health behaviours were strongly influenced by their social context, and health beliefs of those around them (spouse, children, work colleagues). Going against social norms risked social positioning, cultural belonging and job security. This risk was greater than a hypothetical risk of diabetes. Environmental influences, housing insecurity, rising cost of living, food affordability were also important influences on the ability to eat well and exercise.

Conclusions: Current diabetes prevention policies place a strong emphasis on individual to reduce their own diabetes risk and limited emphasis on social and contextual influences on health. Individuals able to sustain long-term lifestyle change were those whose own 'habitus' and social context aligned with prescribed behaviour change. Further to this, they needed the financial capital to enact changes and live in communities which encourage health promoting practices.

Acknowledgement: Interdisciplinary Research in Health Sciences.

P153 | Prevalence of prediabetes and type 2 diabetes among undiagnosed school teachers in Riyadh, Saudi Arabia: A longitudinal observational study

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Aims: The aims of the study were to estimate the undiagnosed diabetes and prediabetes prevalence among teachers in Riyadh, Saudi Arabia and identify associated factors and, additionally, to assess the benefits of early detection in preventing diabetes-related morbidities and delaying the onset of diabetes using HbA1c and fasting plasma glucose (FPG) as indicators.

Methods: An online diabetes risk score questionnaire was sent out to teachers in Riyadh, Saudi Arabia to recruit participants and categorise them as either low or high risk. Those previously diagnosed with diabetes or prediabetes, taking diabetes or weight loss medication, or pregnant were excluded from the study. High-risk participants were invited to do diabetes diagnostic tests at collaborating primary healthcare centres, followed by standard clinical care if diagnosed with diabetes or prediabetes. A 3-month follow-up was done to assess changes in HbA1c and FPG.

Results: Among 945 participants recruited 41% were female, participants mean age was 42.5 ± 7.1 years, and 372 (39.4%) were identified as high risk. Out of 109 high-risk participants that came for testing, 7 (6.4%) diabetes and 19 (17.4%) prediabetes cases were found. Follow-up results for the diabetes group showed mean reductions in HbA1c by 2.1% (95% CI −4.56 to 0.41), and FPG by 4.6 mmol/L (95% CI −10.12 to 0.87) in comparison with baseline results. However, the prediabetes group showed a marginal increase in mean HbA1c by 0.001% (95% CI −0.11 to 0.11), and a slight reduction in mean FPG by 0.1 mmol/L (95% CI −0.71 to 0.49).

Conclusion: The findings in this study show the importance of systematic case finding in diabetes management and prevention. Additionally, early detection and intervention for diabetes may lead to better health outcomes and reduce the burden of diabetes related complications.

P154 | How do UK general practice staff understand and manage prediabetes? A focus group study

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Background: Preventing type 2 diabetes is a national priority; one aspect is the identification and active management of 'prediabetes' through lifestyle change.
Aim: The aim of the study was to explore what primary care clinicians understood by 'prediabetes', how they communicated this diagnosis to people, how they delivered lifestyle advice, and their views on barriers to lifestyle change.
Design and Setting: Three focus groups were undertaken with 25 individuals from primary care teams (GPs, nurses, healthcare assistants, administrative team) in a deprived and ethnically diverse part of London, UK.
Method: Recordings were transcribed verbatim and analysed thematically before integrating social and behavioural science theories.
Results: Focus groups participants described four main influences on their management of prediabetes in the consultation: social determinants, clinical aspects of diagnosis and management, patient motivation and behaviour change, and long-term care. Since most felt unable to address social determinants such as poverty, discussions with patients tended to focus on attempts to change individual behaviours and achieve particular numerical targets, with limited attention to the social context in which behaviours would play out.
Conclusion: Type 2 diabetes prevention efforts in general practice may fail to address the upstream causes of this disease. A narrow focus on numerical targets and decontextualised behaviours overlooks the social complexity of human behaviour and lifestyle choices. Within the consultation, we recommend that greater attention is paid to discussing the social context and meaning of particular behaviours. Beyond the consultation, collaboration between primary care clinicians, public health bodies and local governments is required to address community-level constraints to behaviour change.

P155 | Should conventional oral glucose tolerance test (OGTT) still be the gold standard to diagnose glucose abnormalities in patients with CF (PwCF)

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Introduction: Although the OGTT is the widely recommended screening test for CFRD diagnosis, continuous glucose monitoring (CGM) is increasingly considered a useful and easy-to-perform test in clinical practice. While early glucose abnormalities in PwCF are commonly detected by CGM, relationship between these CGM abnormalities and OGTT in PwCF have not been fully characterised.
Aim: The aim of the study was to look at OGTT and compare with CGM to identify glucose abnormalities for PwCF at the Manchester Cystic Fibrosis Centre.
Method: Departmental clinical database examined to identify patients who had undergone OGTT and CGM between Jan 2022-December Jan 2023. OGTT was classified by WHO criteria and CGM diagnosis was by Brompton Criteria. For the purpose of comparison in this study we used a cut off of 7.8 mmol/mol to classify our PwCF as having normal glucose regulation (Normal) and those having abnormal glucose regulation (Abnormal) on OGTT.
Results: Thirty-eight patients identified. 20/22 patient with normal results on OGTT were noted to have glucose abnormalities on CGM. In comparison with CGM, OGTT had poor sensitivity to pick up glucose abnormalities. The sensitivity of the OGTT 9.1% (1.6%, 30.6%) and specificity of OGTT was 100% (75.9%, 100.0%).
ROC curve shows diagnostic ability of the OGTT compared with the classification on CGM. AUC is 0.54626 (0.3552, 0.7300) (95% confidence intervals).
Conclusion: CGM has higher sensitivity to pick up glucose abnormalities in PwCF and is a better useful tool to diagnose glucose abnormalities than traditional OGTT in PwCF.

P156 | Recruiting people with prediabetes to the National Diabetes Prevention Programme (NDPP) from a secondary care healthcare setting: A pilot study

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Background: Over 1.3 million referrals have been made into the NHS-NDPP from primary care settings to date, with recent research demonstrating a 20% reduction in type 2 diabetes incidence in those referred compared to those that were not. Pressures in primary care may reduce the ability to invite, screen and refer those with confirmed prediabetes. Individuals who are eligible for referral may also be found when they are admitted to hospital.
Aims: The aim of the study was to demonstrate the feasibility of identifying individuals who met the NDPP referral criteria as hospital inpatients and invite them to participate from a secondary care hospital setting.
Methods: Working with our local NDPP provider, an electronic patient search template was created by hospital IT, resulting in a daily report (containing relevant metrics for NDPP referral, including HbA1c results from hospital-based testing) sent to the hospital diabetes team for 3 months. This team then cross-checked information against electronic GP records and wrote to eligible individuals directly, inviting them to participate in the NDPP.
Results: Between February and April 2023, 337 individuals were identified as having prediabetes through digital means, with 188 of those eligible to be approached for enrolment, with 25 agreeing to be referred.
Conclusion: Our pilot has demonstrated that it is feasible to recruit individuals to the NDPP from secondary care, further supporting collective healthcare efforts to reduce rates of type 2 diabetes incidence.

P157 | The early identification of women with pre-existing diabetes through the NHS National Screening Programme in an at-risk population

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Aims: The aim of the study was to investigate the possibility of pre-existing diabetes in a population of pregnant women with no former diagnosis of diabetes.
Methods: Antenatal screening for sickle cell and thalassaemia is offered to all pregnant women in line with the NHS National Screening Programme. UHL is classified as a high prevalence area and so all screening samples received are tested using High Performance Liquid Chromatography (HPLC). This technique also enables for detection of HbA1c due to the ability to separate different haemoglobin types and while not validated for reporting this result can identify women who may have undiagnosed diabetes.
In a 6-week period, six women were referred to the antenatal diabetes service from antenatal screening. These women were then contacted, and the possibility of undiagnosed pre-existing type 2 diabetes discussed. An urgent oral glucose tolerance test was facilitated (OGTT) to establish their glucose status.
Results: Two women miscarried before an OGTT could be facilitated, three were Asian, two Black African and one White British. One had a BMI in the normal range and one was previously known to have GDM.
Four women had an OGTT that ranged between a fasting of 6.5–8.2 mmol/L and a 2h of 9.7–19.2 mmol/L. Their subsequent HbA1c ranged between 65 and 76 mmol/mol.
Conclusions: The laboratory tests confirmed this innovative incidental findings of the HPLC testing. Further analysis and the continuation of this referral system and widespread national enquiry could improve the pregnancy outcomes for pregnant women in these at-risk populations.
Acknowledgement: Diabetes antenatal service.

P158 | Intervening to delay type 2 diabetes in women with a history of gestational diabetes (GDM): A cost-effectiveness decision model

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Aims: This study sought to investigate the cost-effectiveness of intervening to prevent or delay type 2 diabetes in women with previous history of GDM. Intervention costs were taken from BabySteps, an intervention comprising a structured education programme and mobile application. Potential scenarios were modelled for intervention effectiveness, comparing cost-effectiveness of intervening to usual care.

Methods: A Markov modelling approach was used to assess six different scenarios (a risk reduction effect of 10%, 25% and 50% for a time horizon of 80 years, and for the first 5 years post-pregnancy). The model included three distinct states, post GDM pregnancy, type 2 diabetes and death. Cost effectiveness was assessed by comparing costs and quality-adjusted life years (QALYs) between intervention and control.

Results: Intervening to delay or prevent type 2 diabetes in women with previous GDM was found to be cost-effective across all scenarios assessed. When the intervention effect was assumed to be constant for the entire time horizon of the model, for every QALY gained, there was a mean £5054 (4971, 5135) saved for a 10% reduction, £5268 (5192, 5344) for a 25% reduction, and £5276 (5205, 5348) for a 50% reduction in risk of developing type 2 diabetes. The probability of the intervention being cost-effective across all scenarios was 100% at willingness-to-pay thresholds of £20,000 and £30,000.

Conclusions: Due to the increased costs of type 2 diabetes management and complications, an intervention such as BabySteps in women with GDM is highly likely to be cost-effective compared to no intervention.

Clinical care and other categories posters: Education and self-management

P159 PD | Comparison of adolescents with type 1 diabetes 24 h movement behaviours (physical activity, sitting and sleep) to the Canadian 24 h movement behaviour guidelines

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Introduction: Adolescents with type 1 diabetes are required to manage their blood glucose throughout the entire 24 h day. Sleep, physical activity and sedentary behaviour can have a significant impact on adolescent type 1 diabetes outcomes and should be considered.

Aim: The aim of the study was to compare type 1 diabetes adolescents 24 h movement behaviours to 24 h movement behaviour guidelines.

Methods: Thirty-nine adolescents (11–18 years) wore an accelerometer on their non-dominant wrist for 14 days. Hildebrand cut-points were used to categorise sedentary behaviour (SB), <35.6 mg/1s, light physical activity (LPA), ≥35.6 mg/1s and moderate-vigorous physical activity (MVPA), ≥201.5–706.9 mg/1s. To estimate sleep duration the Van Heest heuristic algorithm was utilised.

Results: The sample ($n = 39$) had a mean age of 14.4 ± 1.9 years, an average diabetes duration of 5.6 ± 4.4 years and the average HbA1c for the group was 7.7 ± 1.4%. This sample was composed of 38.5% male and 61.5% female White British participants who mostly monitored their blood glucose levels via continuous glucose monitor (CGM) (76.9%) and delivered insulin by pump (61.5%). Average sedentary time was 10.4 ± 1.7 h/day, LPA time was 5.0 ± 1.6 h/day, MVPA time was 24.4 ± 24.3 min/day and sleep time was 8.2 ± 0.7 h/night. From this preliminary data, 7.1% of the sample met the MVPA recommendations (60 min/day of MVPA) and 50% met the sleep duration recommendation (8–10 h/night).

Conclusion: A large proportion of adolescents with type 1 diabetes do not meet the MVPA and sleep recommendations. Future research should explore the different combinations of each behaviour and how they might interact and impact on important type 1 diabetes outcomes. This will inform any future interventions to support healthy 24 h movement behaviours in this population.

Acknowledgement: The Balancing Healthy Days Working Group.

P160 | A diabetes-related knowledge survey examining inpatient hospital diabetes management and educational preferences for 40 foundation doctors, thereby identifying areas for educational intervention and a preference for face-face education

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Aims: An online survey was designed to identify areas of low confidence and gaps in knowledge in diabetes inpatient management among foundation trainees.
Methods: A Google survey assessing confidence and knowledge in managing common diabetes related issues such as hypoglycaemia, hyperglycaemia, diabetic ketoacidosis (DKA) and hyperglycaemic hyperosmotic state (HHS) was sent via WhatsApp to foundation doctors across Liverpool University Foundation Trust Hospitals.
Results: Of 200 foundation doctors contacted, 40 responded with a response rate of 19 from Foundation Year 1 doctors and 21 from Foundation Year 2 doctors.
Majority indicated they have managed hypoglycaemia (80.0%) and hyperglycaemia (87.5%) with a relatively smaller number having managed DKA (60.0%) and HHS (35.0%).
77.5% of responders stated they knew how to manage hypoglycaemia; however, only 47.5% felt confident in manging it. Management of these problems were identified correctly by over 60% in scenario-based questions.
35.0% and 25.0% stated they knew how to manage DKA and HHS respectively. Only 27.5% were confident managing DKA and 15.0% with HHS. Over 70% were able to identify correct management in DKA scenario questions.
Responders identified face-to-face teaching (45.0%), QR code to access a diabetes handbook (22.5%) and a phone-based diabetes app (17.5%) as educational and support preferences.
Conclusion: Foundation doctors expressed more confidence in managing diabetes related issues they had exposure to such as hypoglycaemia, but the confidence was less in less commonly encountered problems such as HHS.
Our team has used this survey as a basis to introduce SIMS training to help educate trainees.

P161 DUK PD | Feasibility study and process evaluation of a psychosocially modelled diabetes education programme for young people with type 1 diabetes: The Youth Empowerment Skills (YES) programme

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Aim: Type 1 diabetes can be challenging during adolescence, both socially and psychologically. To address this, we codesigned a psychosocial programme called 'Youth Empowerment Skills' (YES) with young people who have type 1 diabetes. In this study, we aimed to test the feasibility of the programme and estimate its impact on clinical, psychosocial and behavioural outcomes.
Method: A feasibility randomised controlled trial (waitlist-design) considering acceptability, implementability, recruitment and completion, with estimated effects on clinical outcomes, diabetes self-management, illness perception and quality-of-life outcomes was conducted. Data were collected at baseline, 6 and 12 months using standardised scales, interviews and medical record data.
Results: Fifty-six participants consented (mean age 16 years) and 46 participated in YES. Only 29% agreed to randomisation, resulting in abandonment of randomisation. The consent rate was 45% and programme completion 91% ($n=42$). Data completion was 87% ($n=40$). Mean HbA1c reduced by 3.3 mmol/mol and 0.9 mmol/mol from baseline (71.7 mmol/mol) at 6 and 12 months respectively; and 34% ($n=15$) and 22% ($n=8$) of participants experienced a clinically significant reduction in HbA1c (≥5.5 mmol/mol) at 6 and 12 months. Reductions were observed in the number of severe hypoglycaemic and hyperglycaemic events and hospital admissions in the in the 12-month follow-up period, compared to 12 months pre-YES. Qualitative questionnaire data showed the impacts of YES as being more open about diabetes, having increased self-care activation, improved confidence and autonomy.
Conclusion: Recruitment and retention were feasible; randomisation to a waitlist design was infeasible. The observed clinical, psychosocial and behavioural outcomes need to be tested in a larger study.

P162 | Ameliorating type 2 diabetes risk through a walking and touch rugby programme in overweight males

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Refer to Oral number A52.

P163 | Investigating the Mediterranean-style diet with or without HIIT on metabolic risk markers in post-menopausal women: A randomised-controlled trial

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Aims: The Mediterranean diet is associated with metabolic health benefits. This study sought to investigate the effects of the Mediterranean-style diet with or without HIIT on metabolic risk markers in post-menopausal women (PMW).
Methods: Thirty physically inactive, overweight/obese PMW (age: 56.6 ± 4.0 years, BMI: 30.5 ± 5.2 kg/m^2) participated in an 8-week life-style intervention. Participants were randomised into three groups: (1) control (CTL $n = 10$); (2) exercise only (EX; $n = 10$); (3) exercise and diet (EX+D; $n = 10$). The life-style intervention comprised of performing home-based, equipment-free high-intensity interval training (HEFHIIT) thrice weekly for 20 min per session in the EX and EX+D groups, with an addition of a Mediterranean-style diet plan in the EX+D group. Body composition, blood pressure (BP), glycaemia, insulin and lipid markers were measured pre- and post-intervention.
Results: Waist circumference, visceral adipose tissue (VAT) and diastolic BP significantly decreased in both EX and EX+D ($p < 0.05$). Weight, body mass index (BMI), hip circumference and body fat percentage significantly decreased across time in the EX+D groups only ($p < 0.05$). However, fasting insulin, weight, BMI and VAT significantly increased ($p < 0.05$) in CTL group.
Conclusions: Incorporating HIIT with the Mediterranean-style diet show superiority than HIIT alone in benefitting markers of metabolic health. Although no changes were observed in metabolic blood markers in either intervention groups, this study highlights that positive lifestyle interventions can improve metabolic risk and PMW with overweight/obesity who do not actively engage in healthy lifestyle behaviours are sedentary can exacerbate metabolic risk within just 8 weeks.

P164 | Evaluation of lifestyle modification in mediating ghrelin response in at risk postmenopausal women: A randomised-controlled trial

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Aims: Dysregulated ghrelin levels are associated with metabolic and glycaemic dysfunction. This randomised-controlled trial (RCT) sought to investigate the effects of the Mediterranean-style diet (MedDiet) with or without HIIT on ghrelin levels in post-menopausal women (PMW).
Methods: Thirty sedentary, overweight/obese PMW (age: 56.6 ± 4.0 years, BMI: 30.5 ± 5.2 kg/m^2) participated in an 8-week life-style intervention. Each participant was randomised into either three groups: (1) control (CTL; $n = 10$); (2) exercise only (EX; $n = 10$); (3) exercise and diet (EX+D; $n = 10$). The life-style intervention comprised of performing home-based, equipment-free high-intensity interval training (HEFHIIT) thrice weekly for 20 min each in EX and EX+D, with an addition of a MedDiet in EX+D. Pre- and post-intervention acyl ghrelin (AG) and des-acyl ghrelin (DAG) were measured.
Results: AG significantly increased in EX, with unaltered DAG levels, while in CTL, DAG significantly decreased with no change in AG. In EX+D, DAG significantly decreased ($p < 0.05$) with non-significant increase in AG levels. Significant increases in weight and body mass index (BMI) change were observed in CTL that positively correlated with DAG change ($p < 0.005$). Significant increases in visceral adipose tissue (VAT) observed in CTL were negatively correlated with AG change ($p < 0.05$). No between-group differences were observed in AG and DAG change.

Conclusion: Significant decreases in DAG were associated with increases in weight and BMI, and negative correlations between AG and VAT in sedentary, overweight and obese PMW. However, beneficial alterations in circulatory ghrelin profile can be seen following an 8-week HEFHIIT with MedDiet. Further exploration may yield novel therapies for dysregulated ghrelin profiles in PMW and associated metabolic dysregulation.

P165 PD | Co-creating a digital wellbeing platform with young people who live with type 1 diabetes

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Aims: Adjusting to life after a diagnosis of type 1 diabetes can be challenging, partly owing to the complexity and daily demands of self-management, which can negatively impact wellbeing. Currently, no centralised means exists for young people to digitally track, monitor and access support for psychosocial wellbeing. This project aims to co-create a digital wellbeing platform with young people, with a view to future phased trials. Co-creation facilitates empowerment of young people, necessary for establishing agency for wellbeing when living with type 1 diabetes.
Methods: Semi-structured online PPI groups were facilitated with six young people and two adults living with type 1 diabetes, two caregivers and six healthcare professionals. Sessions sought to understand the impact type 1 diabetes has on psychosocial wellbeing and how to develop a digital wellbeing platform consistent with young people's needs. Sessions were recorded, transcribed, and deductively analysed using content analysis methods to identify themes.
Results: Key challenges included: burnout from diabetes management; stigma; and isolation from peers. Preferences for key content design features and topics were discussed, alongside preferred formats and routes of dissemination. Young people felt information about coping at school, exposure to lived experiences and logging and tracking psychosocial wellbeing data would empower them to discuss wellbeing with trusted others including care teams. The platform is currently under development and will be continuously and iteratively co-created with young people.
Conclusions: This project highlights known psychosocial challenges experienced by young people living with type 1 diabetes and presents a meaningful approach to co-creating a novel digital wellbeing platform.

P166 | Combined physical exercise and education: How does this impact the lives of people living with type 2 diabetes, in the short and longer term?

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Aims: We aimed to determine the efficacy of adding exercise to an already proven evidence based and structured education programme. We were looking to improve fitness, glycaemic control, cardiovascular markers and psychological outcomes in people living with type 2 diabetes.
Methods: Four cohorts of people living with type 2 were offered an 8-week course of combined exercise and education. Pre and past-course exercise testing, HbA1c, blood pressure (BP), total cholesterol (TC), body mass index (BMI), hospital anxiety and depression (HAD) scores. HbA1c, TC and BP follow-up at 1 year.
Results: From the first three cohorts with a total of 35 completing participants, there was an average reduction in HbA1c of 9.26 mmols/mol, waist circumference of 2.02 cm, TC 0.67 mmol/L, BP 7.76 mmHg, BMI 0.58 kg/m^2, and an increase of O_2 SATs 1.7%, metabolic equivalents (METS) 0.54 O_2/kg and HAD score 3.33. One-year follow-up nearly complete with an average HbA1c drop of 16.9 mmol/mol in cohort 1.
Conclusions: Combining exercise with education for people living with type 2 diabetes, has a profound effect immediately after the 8-week course and one that continues to improve over the year. Giving people the tools to continue changes through food choices, a full understanding of their diabetes and through exercise, was shown to be effective in the short term and even more effective at 1 year.

P167 | Raising awareness of inpatient diabetes foot examination

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Background: Timely referral to the inpatient multidisciplinary diabetes foot team, relies on being able to perform a simple examination of the feet and awareness of the inpatient multidisciplinary diabetes foot pathway.
Methods: Using a questionnaire linked to a QR code we evaluated the knowledge and experience of staff nurses and junior doctors in examining the feet of people with diabetes. We also evaluated their awareness of the inpatient diabetes foot pathway and understood their preferred way of improving their knowledge of diabetes foot disease.
Results: Thirty-seven staff nurses and foundation year doctors (FY1 and FY2) completed the survey. Most (89.2%) understood the significance of diabetic foot examination. Over half (51.4%) had not performed a diabetic foot examination previously. Over a third (37.8%) were not aware of the process of escalating an abnormality found on examination of the feet to the inpatient multidisciplinary diabetes foot team. Most found 'touch the toes test', simple to use, with only a small proportion (10.8%) being unsure about how to perform the test. Under half (45.9%), preferred bedside teaching sessions and 27%, formal teaching session to improve their knowledge of diabetes foot disease.
Conclusion: Examination of the feet in people with diabetes should be taught in nursing and medical schools and this knowledge should be reinforced during hospital induction and junior doctor teaching sessions. It is also important to educate staff on the referral process to the multidisciplinary diabetes foot team and ensuring that the diabetes foot pathway is easy to access.

P168 | Developing the Dose Adjustment for Normal Eating (DAFNE) course for hybrid closed loop (HCL) users: To bolus or not to bolus? Incorporating lived experience to inform an educational intervention

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Aims: The aims of the study were to involve people with lived experience in the development of the HCL DAFNE course by inviting a group of HCL users to feedback their experience of bolusing for carbohydrate snacks, which will inform course content and design.
Methods: Members of a local pump service, on HCL with an HbA1c of less than 58 mmol/mol, were asked for feedback on the following two questions:

1. Have you found that for small snacks you do not need to bolus?
2. If yes, what is the maximum amount of carbs, in grams (g), that you can eat, without your glucose rising above 10 mmol/L?

Results: Of the 104 people contacted, 47 replied, a 45% response rate. The amount of carbs that required a bolus varied with 28% ($n=13$) reporting over 10g, 23% ($n=11$) around 10g, 17% ($n=8$) between 5 and 10g and 32% ($n=15$) under 5g or that the HCL would not automatically correct a rising glucose sufficiently. Free-text responses indicated that the decision to bolus was influenced by activity level, initial sensor glucose, glucose trends (arrows) and the type of carbs in the snack.
Summary: Feedback indicates that glucose response to snacks without a bolus is individual. Around 50% of responders reported their HCL would manage snacks of 10g of carbohydrate or more, and around 50% reported their system being able to manage snacks of less than 10g. These findings suggest that educational guidance should incorporate a degree of variation, acknowledge factors that influence the decision to bolus or not and encourage experiential learning in this area.

P169 | A successful step for our service: HbA1c results at 12 months for patients going through the Scottish Type 1 Education Programme (STEP)

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Refer to Oral number A53.

P170 | Swansea Home Based, Equipment-Free High Intensity Interval Training (SHE-FHIIT): Mediation of dysglycaemia in overweight/obese postmenopausal women (PMW) through home-based exercise: A pilot study

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Aims: Hormonal fluctuations present in the menopause transition are associated with adiposity and resultant metabolic dysfunction. The SHE-FHIIT study aims to evaluate whether HIIT in PMW can mediate exacerbated adiposity and resultant dysglycaemia in those with and without impaired fasting blood glucose (iFBG).
Methods: Ten sedentary, overweight/obese PMW participated in an 8-week exercise intervention (SHE-FHIIT); thrice 20-min sessions/week achieving a heart rate (HR) of >80% HRmax/session. Adherence reported via HR monitoring. Glycaemia and body composition were assessed pre- and post-intervention. Data analysis stratified to normal FBG (nFBG; 5.2 ± 0.7 mmol/L, $n = 5$) and iFBG (iFBG; 6.9 ± 1.0 mmol/L, $n = 5$). Baseline data was comparable across the two groups. CGM analysis conducted in weeks 0 and 8. Visceral adipose tissue mass (VATmass) assessed through DXA.
Results: SHE-FHIIT had average adherence rate; 93%, with no reported adverse events. Across time, no significant reductions in weight, BMI or waist circumference reported for both nFBG and iFBG ($p > 0.05$). VATmass was significantly lowered in nFBG (-30.7 ± 11.8g, $p < 0.05$), yet no significant alteration in iFBG (-6.8 ± 6.8g $p = 0.09$). In nFBG only, there was an improvement in glycaemic variability ($-1.8 \pm 1.5\%$ $p < 0.03$). There was a significant reduction in BMI adjusted FBG in those with iFBG (-0.5 ± 0.3 mmol/L, $p < 0.05$).
Conclusion: Pilot data indicates SHE-FHIIT is a feasible method that engages PMW in exercise over an 8-week period. Evidence suggests independent of improvements in body composition, SHE-FHIIT may mediate dysglycaemia in PMW with iFBG.

P171 | Factors affecting diabetes self-management in young people and their families: A qualitative study

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Introduction: For young people with type 1 diabetes, self-management activities are conducted within the context of family support. Currently there is a deficit of effective strategies to support adolescents for whom self-management is not working.
Aim: The purpose of this study was to explore the factors which young people and their families considered to be important in self-management of type 1 diabetes.
Method: Five young people aged 12–15 years, three with HbA1c <58 mmol/mol and two with HbA1c ≥75 mmols/mol but <100 mmols/mol, took part in semi-structured interviews along with family members which they had identified as important in their diabetes care. A grounded theory approach to thematic analysis was adopted to identify themes relevant to the aim of the study.
Results: Three major themes were identified by families: (1) managing diabetes, (2) care of others and (3) living with diabetes. Transfer of responsibility for diabetes self-management from parents to the young person was identified as important for the future, but responsibility for insulin dose adjustment was often retained by parents. Families of young people with HbA1c <58 mmol/mol relied on problem-focused reviews to adjust doses using immediately available data, rather than undertaking detailed comprehensive reviews of pump/meter downloads.
Discussion: Instead of emphasising regular downloads, healthcare professionals should provide support for targeted, problem-focused reviews, promoting a 'trial and error' approach to adjusting insulin doses. Healthcare professionals should encourage and equip parents to transfer responsibility for insulin dose adjustment to their children. The transition to secondary school may be a crucial period in this transfer.

P172 | Carer mapping for people living with type 1 diabetes and cognitive impairment: Who is involved in supporting people living with type 1 diabetes and cognitive impairment?

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Background and Aims: The development of cognitive impairment in adults living with type 1 diabetes typically results in a transition from independent self-management of diabetes to a reliance on others. This involves practical diabetes support, encompassing insulin dosing and carbohydrate counting decisions. Support may come from formal or informal, paid or unpaid carers and in an own home or care home environment. We wanted to investigate the number and diversity of people involved in the care of individuals living with type 1 diabetes and cognitive impairment to better understand the training requirements of carers.
Methods: Twelve individuals living with type 1 diabetes and cognitive impairment were identified in the West Hampshire Community Diabetes Service caseload, with half residing in their own homes and half residing care homes. A survey to identify all those involved in the person's diabetes care was completed by care home staff and family members.
Results: The responses identified a wide variety of carers including spouse or partner, neighbours, other family members, friends, community nurses, care home staff, private care staff, cleaners and primary and community staff involved in providing diabetes care. One care home identified 65 different people providing care to one resident while for others, only one carer was involved.
Conclusions: Various caregivers may assist those living with type 1 diabetes and cognitive impairment. Specialist diabetes teams play a role in providing stratified and tailored training to enhance caregivers' confidence and knowledge in supporting those living with type 1 diabetes and cognitive impairment.

P173 | Improving cardiometabolic health in populations with lower educational attainment (PLEA): A realist review

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Aims: PLEA have a higher incidence of cardiometabolic conditions, including type 2 diabetes, and have poorer outcomes. Self-management education is a cornerstone of cardiometabolic disease management and research shows that PLEA have different preferences around the design of such programmes. They therefore represent an important group for specifically tailored interventions. This study aimed to understand what features of patient education programmes work, for this population and in what circumstances.
Methods: A realist review of the literature was undertaken. Existing literature was scoped, and professional and patient expert discussion groups were held to produce a list of candidate theories. A systematic search of the literature was performed, and results organised against candidate theories that they supported or contradicted. Findings were analysed to produce a final list of theories about how an educational intervention could work to improve cardiometabolic outcome for people with lower educational attainment.
Results: Thirty-seven candidate theories were identified. These were further broken down into:

- Reaching the population of interest (visibility and accessibility), including considerations of geography, venue type and intervention timing.
- Engaging the population of interest (attractiveness), including incentives and advertised outcomes.
- Content considerations including actionable, relevant options and associated skills development.
- Ensuring content is assimilated including considerations of health literacy, language, facilitator qualities or credentials, post intervention considerations and follow-up.

Conclusions: This study identified multiple considerations that are important when designing patient education interventions targeted to this vulnerable PLEA group. The work will serve as a basis for future intervention design.

P174 | A single-site feasibility randomised controlled trial comparing '*my hypo compass*' short pyscho-educational intervention with standard care alone in individuals with type 1 diabetes and impaired awareness of hypoglycaemia

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Refer to Oral number A54.

P175 | Living with type 2 diabetes and cardiovascular disease (CVD): A qualitative study on patient and healthcare professional's perceptions

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Background: CVD is a major cause of mortality among people with type 2 diabetes, accounting for approximately half of all deaths. Moreover, despite the high (~30%) prevalence of type 2 diabetes and CVD as a comorbidity and the increase in clinical risk these patients face, there is limited knowledge on how patients self-manage these conditions together, how support is offered by healthcare professionals (HCPs) and what comorbidity healthcare advice is currently given. Therefore, the present study aims to explore patients' perceptions of living with both type 2 diabetes and CVD, and further, would like to increase knowledge of how those diagnosed with these conditions are cared for by HCPs.
Method: In total, 40 patient and 20 HCPs (doctors, diabetic nurses, cardiac specialists) interviews were exposed to thematic analysis informed by Braun and Clarkes (2021) approach.
Results: Themes reported include 'the unknown comorbidity' and 'prioritising immediate issue only' with supporting subthemes. People with type 2 diabetes shared how they only understood their CVD risk after a cardiovascular-related incident or diagnosis and feel the care they receive mainly revolves around medication with little lifestyle management advice. Further, the data derived inconsistencies in both what HCPs see as personalised care and their view on the importance of discussing CVD and CVD risk with type 2 diabetes patients (and vice versa).
Conclusions: With the increase in those living with more than one condition continues, there is an urgent need to move past singular disease-based appointments within primary care to consistent comorbidity support where needed.

P176 | Is blended education for continuous subcutaneous insulin infusion (CSII) as effective as in-person training? Results from a regional audit

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Background: In-person CSII initiation was adapted to a structured blended education model combining in-person and remote sessions during the Covid-19 pandemic.
Aims: The aim of the study was to compare diabetes outcomes of structured blended vs structured in-person education for CSII initiation.
Methods: Data were compared for people with diabetes who received in-person ($n = 50$, 52% male, age 45, diabetes duration 22 years) or blended ($n = 50$, 40% male, age 41, diabetes duration 17 years) CSII education. Medical records were used to gather demographic and insulin usage data. Glucose sensor variables were collected from glucose sensor databases at baseline and post-CSII initiation.
Results: The blended group had lower baseline HbA1c than the in-person group (blended: 58.50 mmol/mol, in-person: 63.00; $p = 0.03$) with no difference in change post-CSII (blended: −4.00 mmol/mol, in-person: −4.00 mmol/mol; $p > 0.05$). Glucose sensor data for Time in Range (blended: +7%, in-person: +9%; $p > 0.05$) and Above Range (blended: −5%, in-person: −10%; $p > 0.05$) showed no differences in change from baseline to post-CSII. The blended group had higher baseline Time Below Range (in-person: 5%, blended: 2%; $p = 0.029$) with no difference in change post-CSII (blended: −1%, in-person: 0%; $p > 0.05$). There was no difference in total Daily and Basal Insulin use between the groups. Baseline Daily Bolus Insulin use was higher in the blended group (in-person: 22.00, blended: 30.00, $p = 0.002$), with a greater change in bolus insulin post-CSII (in-person: +0.45, Baseline: −4.85, $p = 0.018$).
Conclusions: The blended and in-person groups had improved diabetic control post-CSII with similar levels of

change in outcomes. This audit adds to the efficacy of a blended approach to commencing diabetes technologies.

P177 YPS | Co-designing an educational support programme for young adults with type 2 diabetes: Type 2 Take 2

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Aims: The prevalence of type 2 diabetes in younger people is increasing. Type 2 diabetes in younger people is associated with aggressive disease progression, high complication risk and unique psychosocial challenges. Current type 2 diabetes educational programmes are designed for an older adult population. We conducted a service development project to co-design an educational support programme tailored to young adults with type 2 diabetes.
Methods: A co-design approach was used with focus groups to elicit young adults with type 2 diabetes' experiences and diabetes challenges. The outputs from the focus groups were collated to inform the programme design. Further sessions were conducted, in which the young people designed the education programme, mapping the content and approach of the programme to the challenges they identified.
Results: Eighteen adults aged 18–26 years (male/female: 9/9) participated. The identified challenges were feeling isolated, acceptance of diabetes, disordered eating, side-effects of medication, stigma, lack of age-relevant advice. For the programme design, the young people identified that a patient-centred approach focussing on sustainable lifestyle change was needed, incorporating practical, interactive, social and peer-led group sessions. From this we developed the programme curriculum and delivery processes including the underpinning psychological models for the intervention (Social Learning Theory and Acceptance and Commitment Therapy theory).
Conclusions: Young adults with type 2 diabetes experience a number of challenges, have limited access to care and are isolated from others with shared experiences. The programme, Type 2 Take 2, will be piloted and evaluated in 2024.

P178 | Delegation of insulin administration: A survey of community nursing teams in England

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Refer to Oral number A55.

P179 | Adults with type 1 diabetes and reduced awareness of hypoglycaemia: Use of a self-directed learning workbook to explore hypoglycaemic episodes, target glucose levels and consider strategies to reduce frequency and improve awareness of hypoglycaemia

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Introduction: Impaired awareness of hypoglycaemia (IAH) can affect 25%–40% of people who have lived with type 1 diabetes for >15 years. NICE guidelines for type 1 diabetes recommend assessing awareness of hypoglycaemia annually using a Gold or Clarke score.
Impaired awareness of the symptoms of plasma glucose levels below 3 mmol/L is associated with a significantly increased risk of severe hypoglycaemia.
Aims: Our aim was to design and prototype a workbook for adults with IAH (Gold score >3) or recent severe hypoglycaemia to explore and reflect on their hypos and hypo awareness and consider what actions they could take to improve their hypo awareness and ensure they understand the rational for this especially among people who drive.
We sent an evaluation form to those who have used the workbook.
Results: The IAH workbook was developed in collaboration with adults with a history of IAH and diabetes technology use. They felt the workbook was useful but fed back that they would have preferred to receive the workbook at an earlier stage as many felt they had delayed seeking help.

Conclusions: Our novel self-directed IAH workbook has allowed adults living with type 1 diabetes to explore and reflect on their awareness of hypoglycaemia and possible changes they are able to make to regain symptoms. It has allowed us as healthcare professional to work alongside and develop pathways for people with IAH including access to technology.

P180 YPS | The ADAPT approach to improving support for university students with diabetes

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Aims: We designed a novel approach for universities to improve diabetes care and support for university students with diabetes. This involves close collaboration between primary healthcare, specialist diabetes care and university services. The letters ADAPT stand for the aims of our approach, namely being Age-appropriate, providing Diabetes-education, Academics' involvement, Psychological support, and bringing Together a variety of medical and university services.

Methods: During term time, students with diabetes are invited each month for the diabetes clinic (primary + specialist care) and a free lunch, during which students interact with academic and medical staff and receive diabetes education.

Results: Five students attend the diabetes clinic each month and on average 3–4 return for lunch and our peer-support group. We are currently recruiting more students. This clinic works as a 'one-stop clinic' where students can access GP care for other problems as well as specialist diabetes care and blood tests, foot checks, etc. Students raised a variety of practical issues, such as a need for help to get a private fridge in accommodation or being allowed to use their phone during examinations to control their diabetes technology. During peer-group sessions with provided food, students participated in discussions around carb-counting, insulin titration, and approaches to diabetes self-management. Furthermore, students discussed the difficulty of disclosing diabetes to their peers and making new friends.

Conclusions: First impressions of our ADAPT approach suggest that a coordinated approach to supporting students with diabetes increases engagement and improves self-management. We aim to further evaluate throughout the academic year 2023/2024.

P181 | Experiences of physical activity providers in supporting adolescents with type 1 diabetes: 'I think it's quite scary how many teachers don't really know about type 1, and don't know what children have got it'

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Aims: Adolescents with type 1 diabetes are less active than recommended and less active than peers without type 1 diabetes. Several barriers to physical activity have been reported, including lack of confidence in the support received from physical activity providers. This study aims to explore the experiences and needs of physical activity providers in supporting adolescents with type 1 diabetes.

Methods: An online survey was conducted to scope current experience and practice of physical activity providers in supporting adolescents with type 1 diabetes. 34 respondents completed the survey and nine participated in semi-structured interviews to explore issues in more depth. Survey data were summarised descriptively. Qualitative data were analysed using a reflective thematic approach.

Results: Only 10 (29%) survey respondents had received any training relating to type 1 diabetes. Although half of respondents felt confident in supporting adolescents with type 1 diabetes to engage in physical activity, 94% said they would make use and value specific training. Only four respondents (12%) knew of any policies relating to type 1 diabetes in their school or club. From the interviews, four

preliminary themes have been developed: lack of awareness and communication; knowledge of type 1 diabetes; balance of responsibility; and conflict between inclusion and support.

Conclusion: Findings suggest improvements can be made to (1) training for physical activity providers to allow them to better support adolescents with type 1 diabetes to participate in physical activity; and (2) Policies to help ensure a supportive and safe environment for adolescents with type 1 diabetes.

P182 | Impact of Glooko academy on healthcare professionals' competence in managing diabetes technologies and enhancing patient care: The online Glooko academy education portal increases confidence in managing diabetes technologies

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Aim: Glooko Academy is a UK-based free online educational programme around diabetes technologies comprising 56 topics organised into eight courses, covering flash glucose monitoring, continuous glucose monitoring (CGM), continuous subcutaneous insulin infusion (CSII), self-monitoring of blood glucose (SMBG), pregnancy, virtual consultation, sensor augmented pumps and connected pens. We assessed user feedback on the courses.

Methods: Over 8000 videos were viewed by over 2000 healthcare professionals. 1376 users completed the user evaluation and rated their experience and confidence on a Likert scale (1–5) on completion of each course between December 2021 and March 2023.

Results: Continuous Glucose Monitoring was the most popular course, completed by 26.5% of participants. Positive feedback was received across all courses, with participants reporting increased confidence in patient reviews (mean score: 4.3/5.0), comfort in supporting individuals (4.3/5.0), increased confidence in data analysis (4.28/5.0), educational needs fulfilment (4.35/5.0), ease of fitting into schedules (4.1/5.0), ease of use (4.4/5.0) and a high likelihood of recommending courses to colleagues (4.5/5.0).

Conclusion: This study underscores the positive impact of Glooko Academy online courses on healthcare professionals' knowledge and confidence in managing diabetes technologies. These improvements should contribute to enhanced patient care and overall outcomes.

P183 | Access and outcomes with digitally delivered diabetes structured education (DSE) in the Black Country

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Aims: Black Country has an ethnically diverse population with the highest prevalence of diabetes in England with 9.2% of people in the area having a diagnosis of Type 2 diabetes. Digitally enabled programmes have the potential to improve accessibility to culturally relevant, convenient and engaging education. Here, we assess weight loss, HbA1c improvement and retention of a DSE programme for adults living with type 2 diabetes in this community.

Methods: Data from adults with type 2 diabetes following a 12-week digitally enabled DSE programme were collected and analysed to determine weight loss and engagement. All patients had access to a smartphone app for digital learning and monitoring. Remote coach support was provided in multiple languages.

Results: 98.5% of referrals ($n = 9310$) were accepted to the programme. 75.7% of those who completed an initial assessment, completed the programme. Average weight loss at 12 weeks was 5 kg (4.7%; $n = 4959$). 56.1% of participants lost weight. The average reduction in HbA1c was −16.8 mmol/mol (where HbA1c was reported). There was an average increase in diabetes self-management confidence from 6/10 at baseline to 8/10 at 12 weeks. 53% of attendees were male, 78.8% of participants were of working age and 53% from other ethnic origins.

Conclusion: A fully remote digitally enabled type 2 diabetes structured education and behaviour change programme is clinically effective, accessible and engaging, enabling an increase in confidence in self-management of those harder to reach groups living with type 2 diabetes.

P184 | A randomised, controlled crossover study of short-term use of continuous glucose monitoring using the Dexcom G6 to support self-management behaviour in complex type 2 diabetes: The Disco GM study

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Refer to Oral number A64.

P185 | Implementation outcomes of the Youth Empowerment Skills (YES) programme, a psychosocially modelled programme for young people with type 1 diabetes

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Refer to Oral number A65.

P186 | Understanding the unmet needs of adults with type 2 diabetes and diabetes-related foot ulcers (DFU): A qualitative study

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Aim: The aim of the study was to explore the views and experiences of adults with type 2 diabetes and DFU, and their healthcare professionals to identify their unmet needs and ways to optimise care and management options.
Methods: Semi-structured interviews were conducted with 25 adults with type 2 diabetes and current or previous DFUs and 25 healthcare professionals. Topic guides were underpinned by the Theoretical Domains Framework. Interviews were audio-recorded and transcribed verbatim. Data were analysed deductively using thematic analysis.
Results: Four themes and three subthemes were generated using both sets of participant data. (1) DFUs were perceived as a wake-up call by individuals and healthcare professionals; the experience often came as a shock, which prompted individuals to consider what or who is responsible for the development of their ulcer. Personalised education is needed to avoid individuals experiencing shock and according blame. (2) DFUs impacted people's behaviours in multiple ways: (I) it was a catalyst for positive change, (II) fostered unhealthful behaviours, (III) and led to behaviours discordant with healthcare professional advice. Healthcare professionals expressed how co-designed treatment plans and behaviour change training can encourage positive behaviour change. (3) DFUs negatively affected individuals' psychosocial wellbeing; however, support services were scarce and locality dependent. (4) A dearth of appropriate support, for example non-weight bearing physical activity advice and interventions, were available to combat the physical impacts of DFUs, highlighting a need for tailored support.
Conclusions: This study identifies important areas of unmet need regarding clinical care for people with type 2 diabetes and DFUs.

P187 | Supporting type 1 diabetes self-management and psychological wellbeing through a focused peer to peer group intervention in Leicester, Leicestershire and Rutland (LLR)

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Aims: In February 2023, the Podding Peer Support group was created for LLR individuals using the Omnipod Insulin Pump Delivery System, consisting of monthly meetings and a private WhatsApp group.
The aim was to identify whether the intervention contributed to an increase in knowledge and confidence (K&C) and a decrease in levels of diabetes distress.
Methods: Nine participants completed a K&C questionnaire and Problem Areas in Diabetes (PAID) scale questionnaire upon entry to the group between Months 1 and 6. At Month 6 of the intervention, eight participants who had attended more than one session were invited to complete the same questionnaires.

The K&C asked participants to rate a score between 1 and 5 (1 = little K&C, 5 = very good K&C) on three key areas:
- Using insulin pump therapy.
- Using Omnipod.
- Self-managing type 1 diabetes.

PAID is a 20-item questionnaire used to assess diabetes distress. Items are measured from 0 (not a problem) to 4 (serious problem). Scores are multiplied by 1.25, producing a total score. Scores of ≥40 indicate severe diabetes distress.

Results: There was no substantial change in the K&C average:
- Use of insulin pump therapy increased from 3.7 to 4.0.
- Use of Omnipod remained at 3.8.
- Self-managing type 1 diabetes decreased from 4.1 to 3.9.

The average PAID score decreased from 24.86 to 23.28.

Conclusions: This intervention highlighted no substantial change in K&C for people using Omnipod. There was a demonstrated reduction in diabetes distress, indicating the importance of this intervention.

P188 | Continuous glucose monitoring (CGM): The necessity for diabetes self-management and peer support in view of the expanding use of diabetes technology: How prepared are we?

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Aims: The aims of the study were to investigate our patients' views on the ongoing need for CGM data management input from healthcare professionals, ability to self-interpret and react to CGM data, the resources and support used outside standard education and the willingness to receive and provide peer-support.

Methods: The responses of 50 patients randomly selected from our CGM database, over support systems around diabetes technology, were retrospectively studied using a questionnaire. The average length of CGM use was 2.25 years.

Results: Despite 75.6% of patients self-reporting confidence managing CGM-data, 21.4% were not using their data to adjust treatment and 60.7% did not meet their Time-In-Range (TIR)-target.

Although, 86.5% of patients reported that no other CGM-resources, additionally to the Diabetes-Specialist-Nurse (DSN) training session were required, 56.75% independently utilised resources such as 'YouTube', 'Free-Style-LIBRE-Abbott' website (76.2%), friends/family that used similar technology (19%), with only 2 patients using interactive social media-based diabetes groups such as 'UKusersfreestylelibre' (Facebook).

56.7% were keen to participate in a peer-support-group, that is via WhatsApp, within the locality. 76% of this subgroup, showed stability/reduction in HbA1c on CGM.

Conclusions: Rapid expansion in CGM, as per recent National Institute for Health and Care Excellence (NICE) guidance, can pose increasing demands on healthcare systems, highlighting the importance of diabetes self-management and peer-support. The above are strongly embraced by Diabetes (UK) and the Juvenile Diabetes Research Foundation (JDRF)[(NHS)England-2022].

Generally, peer-support is considered underutilised, despite multiple studies including randomised controlled trials (RCTs) showing benefits such as better glycaemic control and overall wellbeing. Today, interactive platforms of communication are more accessible than ever and we, as healthcare professionals, ought to act as enablers for our patients to engage and safely navigate these systems.

P189 | Knowledge of hypoglycaemia and HbA1c improvement in people living with type 1 diabetes through tele-education: A follow-up study

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Aims: The aim of the study was to assess the impact of tele-education on knowledge of hypoglycaemia and HbA1C improvement in people living with type 1 diabetes.

Method: An observational study followed 10% of 400 children under 22 years old who received tele-education. These participants were selected randomly and remained the same for a follow-up study. This is the second session out of ten, completed in October 2023. The first session's results were presented as an e-poster at the IDF Virtual Congress 2023. The study involved structured telephone sessions with pre-session questions, information delivery during the session, and post-session assessment after 8 weeks. Statistical significance was assessed using descriptive statistics in SPSS 21.

Results: The study results show a notable increase in knowledge of blood glucose monitoring and hypoglycaemia management, rising from 26% to 63% ($p < 0.001$). Before the session, 40% of children had HbA1c values over 12%. After the session, the percentage decreased to

30%, with mean/median decreased from 11.05/11.33 to 10.35/10.79. This shows an improvement of 0.7 in mean HbA1C over a period of 8 weeks. This helps project that the improvement can be much more after the full series of sessions has been conducted.

Conclusion: This study concluded that there is a strong and statistically significant improvement in knowledge regarding type 1 diabetes, HbA1c, and hypoglycaemia management through tele-education. It further supports the notion that structured education is essential for families dealing with type 1 diabetes. Additional prospective studies are needed to explore the association between specific topics and knowledge enhancement.

P190 | Measuring self-efficacy and motivation in a group-based type 2 diabetes self-management education programme (DESMOND)

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Aims: DESMOND is a self-management education programme (SMEP) designed for people with type 2 diabetes, aiming to improve their understanding, self-efficacy and outcomes. This one-time, 6 h group programme, attended by up to 10 individuals with type 2 diabetes, is delivered virtually or in-person. The objective is to evaluate the participants' self-reported intentions for health improvement and changes in self-efficacy.

Methods: From October 2022 to September 2023, at the end of each group programme, participants from 31 out of 105 licensed provider organisations provided feedback on their experience via an online survey. Various aspects of their DESMOND programme experiences were assessed. Each question's responses were analysed to determine the overall percentage of positive feedback.

Results: Regarding setting goals for lifestyle changes ($n = 3044$), 96.78% confirmed they did set goals. The areas where lifestyle changes were indicated ($n = 3044$):

- Weight loss: 46.53%.
- Increasing physical activity: 17.43%.
- Cholesterol: 8.73%.
- Blood pressure: 3.16%.
- Food choices: 11.66%.
- Mood: 0.95%.
- HbA1c: 18.49%.
- Other: 10.84%.

When asked about their understanding of diabetes before starting the programme, 15.29% ($n = 170$) reported having a 'Very good understanding' or 'Good understanding'. After completing the programme, 43.06% ($n = 353$) stated they 'Understand a lot more' or 'Understand a little more', denoting a marked increase.

Conclusion: These self-reported surveys demonstrate the effectiveness of this DESMOND SEMP in enhancing self-efficacy, as evidenced by the pre- and post-programme understanding scores. This programme effectively motivates individuals to make lifestyle changes for better health, underscoring the continued relevance of DESMOND, 20 years after its inception.

P191 | The sleep well programme: Aiming to improve glucose control and sleep away diabetic complications one night at a time

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Background: 40% of UK adults obtain inadequate sleep contributing to impairment of cognitive, behavioural, emotional and metabolic processes. This increases the risk of people developing type 2 diabetes and impairs glucose management and homeostasis in people living with all forms of diabetes. Evidence demonstrates cognitive-behavioural interventions to improve sleep are well-tolerated and effective.

Aim: This study aims to build on the results of a pilot study (see below) to design, implement and test feasibility and effectiveness of a scalable, online intervention to improve sleep and glucose homeostasis in people with diabetes.

Methods: The study includes objective measurements of sleep and glucose and self-reported estimates of wellbeing (sleep trackers, continuous glucose monitors, online surveys). The online intervention involves participants watching a video outlining good sleep practices, receiving guidance and support to devise, commit to and self-manage a personalised three-step programme to: set a target sleep time, establish and maintain a consistent routine, modify a sleep-related activity.

Results: A pilot study was performed to test the feasibility of the online intervention ($n = 104$). Responses to surveys at baseline (0), 2 and 4 weeks after the intervention indicated 54% of participants felt their sleep had improved and there was a 36% increase in participants rating sleep quality as good. Interviews with people with diabetes ($n = 12$) were carried out to allow optimisation of all aspects of the study design.

Conclusions: Results indicate the online intervention is effective. Further work will determine the extent to which improvements in sleep translate to improvements in other parameters.

P192 | Adapting the Diabetes Education and Self-Management for Ongoing and Newly Diagnosed (DESMOND) programme to support people in the d/deaf community

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Refer to Oral number A67.

P193 | Patient reported outcome measures (PROMs): The impact of Dose Adjustment for Normal Eating (DAFNE) structured education on people with type 1 diabetes

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Aim: The DAFNE programme aims to understand the impact of DAFNE education on participants. A seven-question PROM survey was created for completion immediately pre- and post-DAFNE:

1. How confident are you with insulin dose adjustment (IDA)?
2. How confident are you with carbohydrate counting (CC)? (IDA and CC scale: 1 to 10;1 being lowest, ≥8 considered high.)
3. Diabetes Distress Scale 1 (DDS1): 'Is feeling overwhelmed by the demands of diabetes...'?
4. Diabetes Distress Scale 2 (DDS2): 'Is feeling that I am failing with my diabetes routine...?'
5. Problem Areas In Diabetes (PAID): 'Is feeling alone with your diabetes...?' (Questions 3,4 and 5 use the scale: 1 'not a problem' to 6 'a very serious problem'.)
6. When do you usually feel your hypos >3 mmol/L, <3 mmol/L or not at all?
7. Do you know when your hypos are commencing? (Gold score)

Method: Paired PROM data from the first 145 participants were examined.

Results: Pre-DAFNE, 56 (39%) registered ≥8 with IDA, rising to 125 (86%) post-DAFNE ($p < 0.0001$).

37 (26%) registered ≥8 with CC pre-DAFNE, rising to 128 (88%) post-DAFNE ($p < 0.0001$).

94 (65%) registered hypo awareness with glucose >3 mmol/L pre-DAFNE, rising to 105 (72%) post-DAFNE ($p = 0.06$).

113 (78%) reported the same (37%) or improved (41%) Gold scores after DAFNE ($p = 0.15$).

Post-DAFNE, 75 (52%) participants registered improvements in DDS1 ($p < 0.0001$), 94 (65%) in DDS2 ($p < 0.0001$), 67 (46%) ($p < 0.0001$) in PAID.

Conclusions: DAFNE education significantly improves biochemical outcomes and also:

- Confidence.
- Hypo awareness.
- Emotional wellbeing.

P194 | Evaluation of an online structured carbohydrate counting eLearning course for diabetes self-management education

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Aims: My Diabetes My Way (MDMW), NHS Scotland's interactive website for people with diabetes, offers free diabetes self-management eLearning courses, accessible to anyone by self-registration. This study aims to describe user uptake and completion of the carbohydrate counting eLearning course offered by MDMW and evaluate its impact on patient-reported outcomes.

Methods: *Carbohydrate Counting* covers key concepts relevant to managing diabetes treated with basal-bolus insulin in the format of online information pages, videos and quizzes. The course's usage data from October 2020 to July 2023 was analysed and a mixed-methods evaluation of pre-course and post-course surveys from the same period performed.

Results: Six hundred eleven users started the course with 340 users completing >60% of the course (55.6% completion rate). Among the 409 users who completed the pre-course survey, 156 (38%) were people with type 1 diabetes, 129 (32%) were people with type 2 diabetes, and 109 (27%) were healthcare professionals (HCP). Patient pre-course goals included improving knowledge in carbohydrate counting, glucose management and healthier eating. HCP pre-course goals included updating knowledge and providing better patient support. Both patient and HCP users found the content relevant and easy to follow. Among patient users with paired pre-course and post-course surveys, there was a statistically significant increase ($p < 0.001$) in self-reported life satisfaction, health knowledge and diabetes self-management.

Conclusions: Online structured eLearning courses are an effective method of education delivery for patients with improvements in short-term self-assessed outcomes following the course. The relatively high proportion of HCPs taking this course indicates a desire for eLearning materials among this group.

P195 | Control It Plus type 2 diabetes education programme and automatic referral pathway: Service user experience and impact evaluation

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Aim: The aim of the study was to better understand the effectiveness of the automatic referral pathway for newly diagnosed type 2 diabetes patients and the impact of the Control It Plus education programme on the self-management of their condition.

Method: The method comprised:

- Interviews with Primary Care staff.
- Interviews with staff delivering Control It Plus sessions.
- Survey of patients automatically referred to Control It Plus ($n = 239$).
- Eighty telephone/video interviews with patients automatically referred to Control It Plus.

Results: Patients who engaged with Control It Plus had a positive experience (88% rated very good/good) with nearly all feeling empowered and confident to manage their condition. Most patients (83%) felt the programme helped them understand diabetes while 69% felt prompted to make changes to their diet and 60% felt prompted to lose weight. The most common barriers to engagement were patients feeling too busy, unwell or that they already had enough information, while there were some barriers associated with the digital delivery of the programme. The automatic referral pathway was praised by patients and health professionals though the conversation a patient has in primary care at point of diagnosis remains a key influence in them taking up the offer of education.

Conclusion: An automatic referral pathway has supported patients to engage with the Control It Plus education programme and other lifestyle support quickly following their diagnosis and has removed the burden of referral from health professionals. The programme is supporting patients' self-management of their type 2 diabetes.

P196 | Self-management interventions in adults with multiple long-term conditions (MLTCs): A mixed methods systematic review

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Aims: The aim of the study was to identify and summarise findings on self-management support interventions which target MLTCs or multimorbidity.

Methods: A search of five databases was conducted to identify quantitative, qualitative and mixed-method studies which reported using self-management support interventions for adults with MLTCs. MLTCs was defined as 'two or more long-term conditions within a single individual'. This protocol was pre-registered on PROSPERO (CRD42022302959).

Results: Twenty-three studies were identified, with 14 reporting on the conditions prevalent within the population and diabetes being reported in 11. Individualised action plans, motivational techniques, and goal setting were frequently used in the interventions.

Pooled analysis indicated a statistically significant effect favouring the interventions in health-directed behaviour (mean difference (MD) = 0.12; 95% confidence interval (CI) 0.02–0.23; $p = 0.02$), self-monitoring and insight (MD = 0.17; 95% CI 0.01–0.33; $p = 0.03$) and skill and technique acquisition (MD = 0.09; 95% CI 0.02–0.15; $p = 0.006$). Pooled analysis indicated no statistically significant effect on quality of life (MD = 0.01; 95% CI −0.02 to 0.03;

$p = 0.64$) or anxiety and depression (MD = 0.72; 95% CI −0.64 to 2.07; $p = 0.30$).

Thematic synthesis of qualitative data also indicated positive outcomes in self-management behaviours. Qualitative data showed that contextual and external factors, such as finances, relationships and social support, positively and negatively impacted self-management and receipt of support.

Conclusions: These findings suggest that self-management support interventions contributed to improved self-management behaviours in adults with MLTCs, without any effect on quality of life or mental health outcomes. Contextual and external factors should be accounted for when designing self-management interventions.

P197 | Treatment satisfaction measures show that UK and Ireland users of the bolus calculator in a mobile health application for people with diabetes have high treatment satisfaction and low perception of hypoglycaemia

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Aims: Patient reported outcomes (PROs) are increasingly valued as important measures to demonstrate the non-clinical benefits of diabetes therapies to people with diabetes, and to inform patient-centred care. Regular use of mobile health (mHealth) applications can support people with diabetes with the day-to-day management of their condition. Previous evidence shows these apps and other digital tools can improve not only just clinical outcomes but also mental health and quality of life. We aimed to investigate the satisfaction of users of the bolus calculator within the mySugr® app on their treatment.

Methods: We performed an in-app survey and retrospective analysis of 254 active users of the mySugr bolus calculator in the UK and Ireland. The survey was based on the Diabetes Treatment Satisfaction Questionnaire (DTSQ). Average blood glucose, variance and percentage of measurements below range before and after use of the bolus calculator were also calculated.

Results: The sample showed a mean DTSQ score of 28/36, with high scores in questions related to general satisfaction and likelihood to recommend the same treatment to someone else with diabetes. Low scores were seen in response to questions related to the perceived occurrence of low and high blood glucose levels. Glycaemic changes were not significant but did show a trend towards reduced variation and percentage of measurements below range.

Conclusion: In a UK and Ireland population of people with diabetes, the use of an app-based bolus calculator was shown to have high treatment satisfaction, with low perception of hypoglycaemia occurrence.

P198 | Abstract withdrawn.

P199 | Exploring the impact of self-compassion interventions in adults with diabetes: A systematic review

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Aims: This systematic review seeks to assess the existing literature to establish whether self-compassion interventions impact clinical, behavioural and emotional outcomes in adults living with diabetes.

Methods: We conducted a comprehensive electronic search of seven databases. The search strategy identified studies involving any self-compassion interventions in adults (aged 19 and over) living with type 1 or type 2 diabetes.

Results: Ten studies were identified involving a total of 323 participants. Samples included both type 1 and type 2 diabetes. Self-compassion interventions took several forms, including Mindful Self-Compassion, Acceptance and Commitment Therapy, Compassion-Focused Therapy and Self-Compassion-Focused Therapy. Intervention durations ranged between six to eight sessions, with varying follow-up periods. Studies reported a range of outcomes, including clinical, behavioural and emotional measures. In terms of physical change, five studies identified a reduction in HbA1c or capillary glucose testing following intervention. Studies observing behavioural outcomes evaluated self-compassion, diabetes engagement, self-care or treatment adherence and identified positive changes following self-compassion interventions. Six studies evaluated the impact of self-compassion interventions on emotional outcomes. Significant improvements were found in self-reported diabetes-specific distress, depression and anxiety. One study also showed increased levels of hope, an essential component of managing any long-term condition.

Conclusion: The integration of self-compassion interventions into diabetes management has established positive effects on a range of diabetes-related outcomes, including blood glucose control, self-compassion levels, self-care practices and overall diabetes engagement. This systematic review highlights the potential of self-compassion interventions to enhance overall wellbeing and clinical management of individuals living with diabetes.

P200 | What have we learned about hybrid closed loop insulin pumps: Top tips for hybrid closed loop insulin pump users

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Aims: This abstract outlines some of the tips we have learned from almost 4 years of using hybrid closed loop insulin pumps.
Method: In November 2019, we started our first patient on an insulin pump with potential to use a hybrid closed loop. Since then, we have worked with around 150 patients on four hybrid closed loop systems and have the following tips for patients and professionals:
Top Tips:

- Accurate carbohydrate counting improves HbA1c and time in target range.
- When practical, give bolus doses 10–15mins before carbohydrates.
- Leave the pump alone between meals – it will do its work.
- Do not treat alarms as hypogylcaemia, check blood glucose levels first and after 15min.
- Reduce hypo treatment to 4–8g carbohydrate as the pump will reduce basal rate to treat hypoglycaemia.
- Remember to re-attach your pump after a shower/ bath/ sport and give correction when re-connecting.
- Do not forget bolus doses.
- Download your pump regularly and review the data.
- Are you having hypos 2–4h after meals? Is your carbohydrate ratio too strong?
- Setting your basal rate to total basal daily dose will help when out of loop.
- Try to use settings that avoid the pump pausing for more than 15min.
- If your blood glucose is above 18 mmol/L, change your cannula and consumables.

Exercise: set temp target/Activity/Exercise/ease off at least 1h before exercise. Avoid eating/bolus before exercise.
Alcohol: use temp target/activity/exercise/ease off, only bolus with *extreme caution*.
Illness: Activate basal rate with 50% more basal insulin or use boost function; Use lowest target available in pump; Consider turning automation off and using as standard pump.
Acknowledgement: Good Hope Adult Insulin Pump Service.

P201 | Adapting a bespoke digital diabetes self-management education programme for people with early-onset type 2 diabetes (EOT2D) (16–45 years)

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Background: Adults with EOT2D (16–45 years) have high burden of disease and poorer long-term outcomes. However, evidence reports low engagement with healthcare services, possibly due to services not being tailored towards their specific needs.
Aims: The aim of the study was to adapt and tailor an existing digital self-management education programme (myDESMOND) specifically for adults with EOT2D. This formed part of a wider NIHR-funded research programme, 'M3' (NIHR201165).
Methods: We performed literature scoping and diverse patient and public involvement activities (PPI) with adults living with EOT2D to understand the landscape of existing support, with further PPI and a qualitative research study to better understand their needs and preferences. PPI group members were invited to take part in developing and reviewing new material for the adapted MyDESMOND digital programme.
Results: A tailored digital self-management programme was adapted, including lived experience media files with adults with EOT2D. These included conversations around important topics raised, such as diabetes-related stigma, men's and women's health and information about sleep and type 2 diabetes. A private chat forum was also developed to allow discussion of topics relevant to their lives, meeting a desire to engage and share experiences with other adults with EOT2D.
Next Steps: Our new digital programme has been included within the innovative holistic intervention developed in the M3 programme, which will be tested through a multi-site randomised controlled trial. The usability

and accessibility of our digital programme for adults with EOT2D will be evaluated as part of a process evaluation embedded within this trial.

P202 | Improving gestational diabetes (GDM) self-management in pregnancy and reducing future diabetes risk

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Aims: A diagnosis of GDM has implications for pregnancy outcomes, as well as long-term health for both mother and child. Up to 50% of women diagnosed with GDM will subsequently develop type 2 diabetes. We aimed firstly, to explore women's motivations for making lifestyle changes to manage their GDM, reduce the risk of birth complications and prevent progression to type 2 diabetes. Secondly, to explore social, cultural, and economic factors which influenced women's experiences of GDM and how these affect decisions about type 2 diabetes prevention.
Methods: Women were recruited into a qualitative interview study, using a purposive sampling approach to achieve ethnic and socioeconomic diversity. The semi-structured interviews were recorded and transcribed, then analysed using thematic content analysis.
Results: Thirty-five women were recruited (68% minority ethnicity, mean age 36.0, SD 5.1). Themes related to engagement with pregnancy guidance were *a psychological burden, for your baby you find a way, coping with every day, building resilience, the service provision, relational interactions* and with postpartum guidance: *left at sea*.
Conclusion: Recommendations include improving the communication of physical activity guidance and access to online dietary advice which meets diverse needs of women, fostering social interaction and signposting to peer support; addressing lack of knowledge of guidance postpartum, by consistent communication at discharge, adequate presentation of personalised risk and a concise provision of guidance. The value of community-situated, culturally specific, intervention is suggested for some women from minority ethnicities Women facing socioeconomic adversity find it harder to consistently engage with recommendations. Multi-faceted structural and policy change is required to address these inequities.

Clinical care and other categories posters: Education and self-management: Covid-19

P203 | Empowering patients with newly diagnosed type 1 diabetes: The success of Scottish Type 1 Education Programme (STEP) during the Covid-19 era

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Aims: STEP is a multidisciplinary structured education program for those with newly diagnosed type 1 diabetes. It aims to develop confidence in diabetes self-management, carbohydrate counting and insulin adjustment[1]. STEP involves eight to ten sessions, with the first six sessions within the first 2 weeks[1]. Pioneered by NHS Forth Valley[1], STEP was introduced to our NHS trust in February 2019. This audit aims to assess the STEP attendance since introduction and the impact of Covid-19 pandemic.
Methods: Session attendance data were collected from TrakCare for all patients undertaking STEP. Yearly data on STEP completion and session attendance from February 2019 was analysed using Microsoft Excel.
Results: From 2019 to 2022, 89%–94% people completed the full STEP programme with everyone attending the first four sessions. No statistical difference in attendance rates was found among pre-, during and post-Covid-19 years. During the Covid-19 pandemic, there was a trend to increased attendance.
Conclusions: Overall attendance at both individual sessions and completion of the full STEP programme was encouragingly high and represents an increase in clinical contacts delivered prior to STEP introduction. Attendance was sustained despite the challenges of Covid-19 pandemic, including key staff redeployment. This demonstrates the importance having a structured programme to deliver a consistent high standard of care for those with new type 1 diabetes. STEP empowers those with newly diagnosed type 1 diabetes to engage with structured education, a key aspect in self-management and outcome improvement. We strongly recommend STEP as a structured education programme for those patients with new type 1 diabetes.
Reference: 1. Kiddell C, Ryan L, Kelly C. A step forward: Delivering structured education from the day of diagnosis of type 1 diabetes. Journal of Diabetes Nursing; 2022.

P204 | Process evaluation of a primary care-based type 2 diabetes remission project in the North East of England

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Aim: A type 2 diabetes remission project, Remission in Diabetes (REMI.D), was funded by Sport England. This project sought to tackle health inequalities by working with multiple organisations to demonstrate a way of scaling up an effective type 2 diabetes remission strategy (diet and physical activity). The aim of this process evaluation was to learn from decisions taken in response to the Covid-19 pandemic and to elicit the value of these findings to funders, stakeholders and patients.
Methods: Twelve stakeholders (local authorities, primary and secondary care, universities, NHS England commissioning, Diabetes UK, Sport England, Everyone Active and Active Partnerships) involved in the design and delivery of the project took part in a semi-structured interview lasting up to 60 min. Data were recorded and transcribed verbatim. Thematic analysis used the pre-determined 'core content' themes from the Medical Research Council and National Institute for Health Research framework.
Results: Three topics for discussion emerged: lack of effective collaboration; impact of reactive changes; and scalability of the intervention. Like many projects designed in real-world settings, REMI.D lacked explicit project theory (a road map) which led to uncertainty around stakeholder priorities (diet vs physical activity). When the project was reconvened in 2022 following Covid-19, the landscape had changed. Despite project changes, the funder remained willing to invest in a 'test and learn' approach.
Conclusions: Stakeholders highlighted the challenges of collaborative working across multiple organisations and the importance of co-production with end-users, offering compelling evidence for clear road maps which outline roles and responsibilities for stakeholders.

P205 | Barriers and enablers to engagement with a type 2 diabetes remission project in the North East of England: Qualitative perspectives of patients

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Aim: A Sport England funded place-based project, 'Remission in Diabetes' REMI.D, located in two deprived local authorities questioned whether type 2 diabetes remission or delayed progression with deprescribing of diabetes medications for adults is possible. The aim of this qualitative research was to identify patient barriers and enablers to engagement.
Methods: Patients had a choice of three diets: total diet replacement (TDR)-Formula Food Products, TDR-Food and Healthy lifestyle approach; and three activity pathways: Everyday life, GP referral and social hub. 20 of the 65 patients participating in REMI.D took part in semi-structured interviews lasting up to 60 min. Data were recorded and transcribed verbatim.
Thematic analysis used the Framework Method and NVivo 12 for coding (Theoretical Domains Framework).
Results: Areas of interest from the patient interviews included: choice, intention, adherence, non-adherence and weight-related stigma. 60% of patients choose the healthy lifestyle approach. Patient-centred feedback was a strong motivator for health behaviour change. Barriers included suboptimal environmental context and resources, and unhelpful social influences.
Conclusions: Addition of a more moderate dietary strategy to the existing NHS England Type 2 Diabetes Path to Remission programme may enable more patients to achieve remission or delayed progression of type 2 diabetes. Embedding a tailored physical activity path within or as a bolt-on to the NHS programme requires consideration. Limited resources should be targeted towards patients who identify with more barriers or fewer opportunities for health behaviour modification. Further research on use of virtual programmes in deprived areas is warranted.

Clinical care and other categories posters: Foot

P206 | Glucose help at the end of the line: Telephone support in the diabetes foot MDT clinic

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Introduction: National guidance recommends optimal glycaemic control in patients with diabetes and foot ulcers. Glycaemic management is a major part of our clinical management within our diabetes MDT foot clinics; however, there is scope for intensive support for some patients in-between their monthly appointments.
Aims: The aims of the study were to improvement patient glycaemic management within the foot clinic and to assess this improvement in HbA1c and frequency of hypoglycaemia over a number of years.
Results: A diabetes specialist nurse led telephone clinic was established. Inclusion criteria included patients in foot clinic, on insulin, with high HbA1c needing titration support or suffering problematic hypoglycaemia. 60 patients audited in 2020 and 2022. A written information leaflet was provided in 2022 which did not exist in 2020 as part of service improvement. Both audits demonstrated a statistically significant reduction in HbA1c. in 2020 baseline HbA1c improved from 86 (±22.5) to 76 (±21) and in 2022 82 (±15.9) to 76 (±18.2). There was also a non-significant reduction in problematic hypoglycaemia from 1% to 0% on both occasions. Average number of calls per patient were three in 2020 and two in 2022.
In 2022 54% of patients were presented with an information. There was a non-significant difference in the improvement in HbA1c in those who received the leaflet (83 (±16.4) to 77 (±18.2) compared to 82 (±15.7) to 75 (±18.6)).
Conclusion: There is significant sustained improvement in HbA1c through the inclusion of a telephone support service; however, further interventions could be considered to see how we can continue to improve outcomes.
Acknowledgement: MWL Diabetes Foot Team.

P207 | Transforming a foot service with transformation funding: Cutting the amputation rates across the region of St Helens and Knowsley

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Introduction: In 2016, the Diabetes Foot multidisciplinary service consisted of two clinics per week. These were overbooked and overran, with major amputation rates in our area greatly above the national average. In 2017, with transformation funding the service was gradually and effectively expanded.
Action: We implemented a Foot MDT with administrative support to discuss complex patients, a weekly inpatient ward round for all inpatients with diabetic foot ulcers, daily inpatient podiatry reviews and a daily outpatient Foot MDT clinic, including a twice weekly Joint Vascular and once monthly Joint Orthopaedic presence. Vascular 'hot slot' and TCC access was available, if required and closer working relationships with community orthotics was developed with in-house insole measurement and fitting, weekly telephone diabetes specialist nurse clinics and an almost virtual antibiotic ward.
Outcomes: In 2013–2015, the major amputation rates in St Helens were 13.6 per 10,000, and in Knowlsey, it was 7.8, compared with the England national average of 8.1 per 10,000. By 2019 to 2021, these major amputation rates fell to 9.1 and 5.0, respectively, compared with the national average of 7.7. A reduction was also seen in minor amputation rates in St Helens over the same period, from 28 per 10,000 to 20.4, while the national average remained between 21 and 22 per 10,000. Positive patient feedback regarding experiences has also been reported.
Discussion: With changes to the service, made possible with transformation funding, an improvement in major and minor amputation rates have been achieved. There has also been a positive impact on the patient experience.

P208 | A 15-year retrospective analysis of the morbidity and mortality rates in people with diabetes with an active Charcot neuro-osteoarthropathy (CN): A single centre experience

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Aims: Charcot's neuro-osteoarthropathy (CN) has been linked to increased risks of amputation and premature mortality. The primary aim was to report the amputation and mortality rate of people with active CN. The secondary aim was to identify participant and CN characteristics associated with these adverse outcomes.
Methods: A single-centre retrospective study. Participants were included if they were diagnosed with an active CN with type 1 or type 2 diabetes presenting to a specialist foot clinic between January 2007 and September 2022. Participant and CN characteristics were analysed to determine relationships with amputation or mortality.
Results: One hundred eighty-six participants were included with 195 CN feet. Median follow up was 2979 days (IQR 1942, 4454), approximately 8 years. The 1-, 5- and 10-year mortality rates were 2.7% (5/186), 18.9% (23/122) and 40% (24/60) respectively. Gender ($p=0.0263$) and previous amputation ($p=0.0034$) were associated with a significantly increased risk of amputation. Previous amputation ($p=0.0048$) and more severe chronic kidney disease ($p=0.0271$) were associated with a significantly increased mortality risk.
Conclusion: Participants with CN had high amputation and mortality rates. More work needs to be done to identify the reasons for this. Clinicians need to focus on multiple risk factor intervention to reduce these adverse outcomes.

P209 | Impact of flash glucose monitoring (FGM) devices on glycaemic control in high-risk diabetic foot patients

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Background: Diabetic foot disease has substantial financial implications for the NHS. A primary goal in managing diabetic foot patients is achieving well controlled blood sugars. The benefits of FGM in type 1 and 2 diabetes are established; however, FGM is more widely available for type 1 patients.
Aim: The aim of the study was to determine whether FGM improves glycaemic control in diabetic foot patients.
Method: High-risk foot clinic patients with frequent clinic attendance were provided FGM device as per NICE guidelines. All patients were switched to basal-bolus insulin if not already. Training on FGM use was provided. Patients were reviewed weekly/bi-weekly depending on ulcer severity and glycaemic control was reviewed at each visit. HbA1c was checked before and 3 months after using FGM. Mean HbA1c reduction and *p*-value (paired *t*-test) was calculated.
Results: Fifteen patients were included, fourteen with type 2 and one with type 1 diabetes. Mean age was 61.99 years (range 30–86), 93% male. Mean baseline HbA1c was 88.47 mmol/L (range 55–132). After 3 months of FGM, mean HbA1c was 69.07 mmol/L (range 49–94). Mean HbA1c reduction was 19.4 ± 22.12 mmol/L ($p=0.0043$). Greatest improvements were in those with higher baseline HbA1c.
Conclusion: FGM significantly improved glycaemic control in this patient cohort. FGM's utility in improving diabetes control is established, though its use in type 2 diabetes is limited as per NICE guidelines and not directly recommended for high-risk foot patients. Further follow-up and larger studies are needed to validate these findings and observe impacts on wound healing.

P210 | Root cause analysis of non-traumatic major amputation in diabetes in a district general hospital: Are we missing opportunities to improve care?

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Background: There is concern that Shropshire and Telford have significantly higher minor and major diabetic foot amputations.
Methods: Data on all 48 major non-traumatic lower limb amputation in diabetes were collected between April 2022 and March 2023. Indicators of care and pathways to amputation were studied.
Results: 38 (80%) patients were between 50 and 80, 9 (18%) over 80 and 1 (2%) was less than 50 years age. 26 (54%) had below knee and 22 (46%) above knee amputation. 22 (45%) had documented diabetes foot check in the preceding year, 39 (80%) had high risk feet, 28 (58%) previous foot ulcers and 19 (40%) previous minor amputation.

23 (48%) had been seen by the foot protection team in the 8 weeks prior to amputation and 26 (54%) did not have an urgent referral to the muldisciplinary (MDT) foot clinic. 39 (80%) had neuropathy, 38 (80%) had peripheral arterial disease and 10% had Charcot's. SINBAD score was unavailable for 19 (40%) as not seen in MDT clinic, the score was 1, 2, 3, 4, 5 and 6 in 2%, 10%, 8%, 33%, 4% and 2%, respectively, in the rest. Pre-amputation x-rays were available in 54%, antibiotics given in 69%, debridement done in 33% and offloading provided in 60%. 23% had lower limb arterial bypass, 21% had angioplasty and 8% theatre-based debridement.

Conclusion: Opportunities for improving foot care exist and could prevent or reduce major amputations as majority were in known high risk feet but did not receive NICE recommended care. A significant number of patients were admitted directly for amputation without having the benefit of amputation prevention interventions.

P211 | A quality assurance resource for the diabetic foot pathway

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The impact and burden of diabetic foot disease in the UK is well known. For patients with diabetes, one of the biggest challenges remains access to high-quality integrated care. There remains unacceptable variation in both service provision and outcomes.

While a lot of work has been done on what constitutes best practice and the service specifications for integrated foot care (by organisations like NICE and Diabetes UK), one of the challenges for both commissioners and providers is to understand the effectiveness of their local care pathways. It is not enough to have the appropriate structures in place. Foot care pathways are complex healthcare systems that cross organisational structures. These structures often create barriers within the patient journey and are leading to unnecessary amputations. Most current measures of diabetes foot care fail to measure the quality and effectiveness of these care pathways.

To address this issue, the Yorkshire and the Humber Diabetes Clinical Network Foot Group has developed a consensus on the core quality standards that commissioners and providers should expect of their local foot care service. The aim of this tool is to provide guidance on the metrics that will inform on how a service is performing against these quality standards and potential sources for this data. It will allow services to be graded (Bronze, Silver, Gold) against each of these quality standards.

Carrying out this assessment will enable organisations to benchmark individual footcare services with others, identify areas for improvement, and ultimately drive-up standards and deliver better outcomes.

Acknowledgement: Yorkshire & The Humber Diabetes Clinical Network.

P212 | High mortality following major amputation in diabetes: An analysis of risk factors and causes of death

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Aims: Mortality following major diabetic amputation is high. We analysed data on factors leading to mortality following major amputation.

Methods: Data on all 48 major non-traumatic diabetic lower-limb amputation between April 2022 and March 2023 were analysed in September 2023. 33 (69%) were alive and 15 (31%) had died.

Results: 90% patients had type 2 diabetes and 67% had diabetes duration>10 years. 17 (35%) were female. 38 (80%) were between 50 and 80, 9 (18%) over 80 years old. 21 (42%) were overweight or obese. 26 (54%) had below knee amputation (BKA) and 22 (46%) above knee amputation (AKA). Half were current or ex-smokers, 58% hypertensive, 79% hyperlipidaemic or on statins, 83% on antiplatelet/anticoagulants. 27 (57%) had eGFR >60 mL/min, 17 (35%) eGFR 30–60 mL/min, 4 (8%) eGFR 15–30 mL/min and none with eGFR <15 mL/min. 37% had preproliferative/proliferative retinopathy or maculopathy, 28 (58%) previous foot ulcers and 19 (40%) previous amputation. 80% had neuropathy and 80% peripheral arterial disease. Cause of amputation was critical ischaemia in 27 (56%), sepsis/spreading gangrene in 17 (36%). 10 patients died in hospital and 5 in the community. Cause of death was cardiorespiratory in 6 (40%), sepsis related to DFU in 2 (13%), sepsis unrelated to DFU in 3 (20%), old age/dementia in 2 (13%) and unknown in 2 (13%). Mortality was similar in BKA and AKA. Mann–Whitney test with Monte Carlo correction suggested age >40 at diagnosis of diabetes, advanced nephropathy and retinopathy additionally predicted mortality.

Conclusion: A third of patients had died within a year following major amputation. Majority were older patients with multiple risk factors contributing both to amputation and mortality, but additional predictors of mortality were nephropathy and retinopathy.

P213 | Should total contact casting be a key skill for every podiatrist?

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Background and Aims: Total contact casting is a gold standard treatment for diabetic foot ulcer and Charcot foot. However, its availability is unknown. The aim was to evaluate the provision of below knee offloading including total contact casting in community and hospital-based diabetic foot clinics.
Methods: Podiatrists looking after people with diabetic feet were invited to take part in a survey.
Results: There were 35 responders, of whom 16 had less than 5 years of experience, 11 had 4 to 10 years of experience and 6 had more than 15 years of experience. 24 podiatrists worked in the community and 11 worked in hospital-based diabetic foot clinics, 29 worked in greater London, and 6 worked outside London.
Twenty-one out of 35 reported that total contact casting was not offered at their practice. Only 15 out of 35 reported that they have had training in casting application. Among the remainder, 17 out of 19 expressed their willingness to be trained how to make a total contact cast. With regard to removable below knee casts, 21 out of 35 indicated that they can issue a device on the same day, 10 out of 35 had a referral pathway to a provider, and 14 out of 35 indicated that they cannot issue a removal cast walker.
Conclusion: This survey indicates the need for training resources and local establishment of casting clinics. As well as significant patient benefit, this will alleviate the burden of centralised casting providers in hospital-based diabetic foot clinics.

P214 | Combined diabetic peripheral neuropathy (DPN)-check and SUDOSCAN as a screening tool for diabetic peripheral neuropathy: The Sheffield prospective study

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Refer to Oral number A29.

P215 | The postcode lottery: Are diabetic foot ulcers associated with deprivation and distance to clinic?

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Refer to Oral number A10.

P216 | Healing wounds saves lives: Patients who heal within 12 weeks have a better 5-year mortality compared to those with non-healing wounds

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Background and Aims: Foot care and wound healing is usually advocated to help prevent amputation, and well reported 1-year mortality via the National Diabetic Foot Audit (NDFA). The aim was to compare the demographics and clinical outcome on presentation with a diabetes foot ulceration (DFU) at baseline and at 5 years of follow-up depending on their 12-week ulcer healing.
Method: This was a retrospective cohort study of patients presenting to a single centre with a new DFU over a period of 1 year. Patients' electronic medical records were reviewed for the subsequent 5 years. With analysis of baseline characteristics and clinical outcomes between the two groups of ulcer healing or non-healing at 12 weeks. The primary end point of mortality at 5 years and secondary outcome of changes in glycaemic control and amputation.

Results: There were 203 new presentations of which 27 were lost to follow-up at 12 weeks, but 79 had healed at 12 weeks, and 97 were non-healing. Overall mean age of 64 ± 14 years, 70% with type 2 diabetes. Baseline HbA1c was comparable between both groups; 73 ± 29 mmol/mol vs 74 ± 25 mmol/mol, respectively, as was their baseline renal function, albumin, anaemia. The 5-year mortality was significantly higher in the non-healing at 12 weeks; 15% vs 56% respectively [$p < 0.001$].
Conclusion: There needs to be more emphasis on the possibility of healing wound early, not just to avoid amputation but perhaps improve on mortality rate too.

P217 | To assess the variation in the definitions used to describe the stages of active Charcot neuro-osteoarthropathy (diagnosis, remission and relapse): A systematic review

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Refer to Oral number A68.

P218 | Analysing risk factors for diabetic non-traumatic major amputation in Shropshire and Telford: Early metabolic and risk factor management is the key to prevention

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Refer to Oral number A70.

P219 | Does HbA1c variability influence healing of diabetic foot ulcerations at 12 weeks?

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Refer to Oral number A71.

Clinical care and other categories posters: Hypoglycaemia

P220 | Clinical features and risk factors associated with severe hypoglycaemia requiring emergency service assistance: A study of 129 consecutive cases reviewed by a community-based diabetes team

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Refer to Oral number A20.

P221 | High number of low interstitial fluid glucose events among patients with type 2 diabetes and chronic kidney disease (CKD) with significant intra-day difference in number of very low interstitial fluid glucose events despite being treated to appropriate HbA1c target

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Aims: The aim of the study was to compare the burden of level 1 (<4 mmol/L) and level 2 (<3 mmol/L) hypoglycaemia between patients with type 2 diabetes with and without CKD.
Methods: Type 2 diabetes subjects on sulphonyl urea or insulin therapy with CKD (eGFR <60 mL/min per 1.73 m^2) and without CKD were recruited from the diabetes clinics in a tertiary-care hospital. Subjects wore the

Freestyle Libre-Pro sensors for 2 weeks. Hypoglycaemia event was defined as an episode of hypoglycaemia lasting >15min. Number of hypoglycaemic events and intra-day difference in level 2 hypoglycaemia were compared between and within the groups respectively.

Results: A total of 134 subjects were recruited: 74 with CKD (44M:30F, 68.5 ± 8.7 years old) and 60 without CKD (36M:24F, 57.2 ± 10.6 years old) with no significant difference in Hba1c between the two groups (66 ± 20 vs 64 ± 16 mmol/mol, $p > 0.05$).

The CKD group had a significantly more level 1, level 2 hypoglycaemic events and glycaemic variability than the non-CKD group at 7.6 ± 9.2 vs 4.8 ± 5.4 events/person, 3.3 ± 5.3 vs 1.2 ± 2.0 events/person and 35.3 ± 9.5 vs 32.3 ± 6.8%, respectively, with all p-values <0.05.

Furthermore, the CKD group had significantly more level 2 hypoglycaemic events at night compared to daytime at 1.9 ± 3.1 vs 1.4 ± 2.5 events/person, $p < 0.05$ whereas there was no significant intra-day difference in number of events at 0.5 ± 1.0 vs 0.7 ± 1.2 events/person, $p > 0.05$ within the non-CKD group.

Conclusion: Interstitial fluid glucose targets should be considered in future glycaemic target setting for diabetes subjects with CKD.

P222 | Inpatient hypoglycaemia management in adults with diabetes: A quality improvement project

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Aims: The aim of the study was to improve the management of in-hospital hypoglycaemic episodes for adults with diabetes.

Methods: We collected data (a week-long snapshot) on how hypoglycaemic episodes in adult diabetes inpatients are identified and managed. Patients less than 18 years old and those without a confirmed diagnosis of diabetes were excluded. Hypoglycaemia has been defined as a blood glucose reading of less than 4.0 mmol/L. Following identification of the hypoglycaemic episodes on the hospital glucose monitoring system, we collected data regarding their identification and management, comparing these to the proposed guidelines by Joint British Diabetes Societies (JBDS). Using process mapping and the Plan-Do-Study-Act (PDSA) cycle, we considered a number of processes (with steps such as creating a poster summarising the key management steps, a 'hypo' box on all wards and organised educational sessions by the diabetic specialist nurses to the nursing staff), before re-evaluating prospective data and further PDSA cycles.

Results: An initial snapshot of 25 patients were identified prior to cycles, and a total of 39 hypoglycaemic episodes documented. Out of the 39 episodes, 13 (33.33%) were managed as per protocol, seven (17.95%) were successfully treated and seven (17.95%) were investigated further by the diabetic team.

Conclusions: Multiple parameters influence the management of hypoglycaemia including delays in identification, lack of frequent monitoring, insufficient knowledge and practicalities like insufficient staffing and lack of necessary equipment. A number of simple steps, including a 'hypo' box, a printed form of local guideline present on each ward and staff education improves identification and management of inpatient hypoglycaemia.

P223 | Use of suphonylureas is a key factor in recurrent inpatient hypoglycaemia

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Aims: We aim to characterise recurrent inpatient hypoglycaemia admissions and episodes, by time and by associated medications.

Methods: A retrospective analysis of all diabetes patients in an acute care hospital over a 2-year period (2017–2019) was performed. Hypoglycaemia was defined as capillary blood glucose (CBG) < 4 mmol/L, and recurrence was defined as episodes occurring at least 1h apart. Patient's demographics, medications, clinical data and hypoglycaemia records were extracted. Chi-square and analysis of variance were used for statistical testing.

Results: A total of 34,689 episodes of hypoglycaemia from 13,494 admissions and 8448 patients (7100 males) with mean age of 67.2 ± 11.8-year-old were analysed. Recurrent hypoglycaemia accounted for 21,340 episodes. Comparison between admissions with single and recurrent episodes of hypoglycaemia showed significant differences in Length of Stay (9.3 ± 11.5 vs 21.5 ± 26.4 days, $p < 0.05$) and Charlson Comorbidity Index (3.6 ± 1.5 vs 3.9 ± 1.5, $p < 0.05$). The use of sulphonylurea (singly or in combination with insulin) was associated with 3367 (50.0%) recurrent hypoglycaemia admissions, compared to 1544 (22.9%) and 557 (8.3%) by premix and basal insulin respectively. When hypoglycaemic episodes are stratified

by time, recurrence occurs most frequently at the 0801–1600 window (4652, 64.7%) as compared to 0000–0800 (9255, 60.4%) and 1601–2359 (7433, 61.0%) windows (ANOVA, $p < 0.001$).

Conclusions: We show that recurrent hypoglycaemia is associated with poorer health outcomes, and sulphonylurea use contributes to recurrent inpatient hypoglycaemia more than other diabetes medications. Sulphonylurea use must therefore be cautioned and remains a key determinant for recurring hypoglycaemia.

Clinical care and other categories posters: Incretin therapies

P224 | Predictors of response to injectable once weekly Semaglutide: Insights from the association of British Clinical Diabetologists Nationwide Audit

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Introduction: Trials have observed individual differences in response to glucagon-like peptide-1 receptor agonists (GLP1RA) according to baseline characteristics. The ABCD audit launched in January 2019 to assess the clinical utility, efficacy and safety of injectable Semaglutide in routine practice. The aim of this analysis was to explore which baseline characteristics might predict larger weight or HbA1c reductions in the real-world.

Methods: Data were extracted from the secure online tool and individuals with baseline and follow-up data available within a defined six (3–9) month window were included. Variables were assessed as both continuous variables and categorical variables in a multivariate regression model. Missing data were multiply imputed.

Results: Six hundred twenty individuals with baseline (mean ± SD) age 58.7 ± 10.7 years, HbA1c 81.6 ± 18.5 mmol/mol (9.5 ± 1.7%), weight 108.2 ± 24.2 kg and BMI 37.6 ± 7.6 kg/m^2. Median diabetes duration was 11.2 years (IQR 6.6–16) and 50.5% (313/620) were male. The median follow-up 0.5 years. HbA1c reduced by 14.9 mmol/mol (95% CI 13.5, 16.1, $p < 0.001$) and weight reduced by 4.2 kg (95% CI 3.6, 4.8; $p < 0.001$). Individuals with higher HbA1c, who were younger or GLP1RA naive had the largest HbA1c reductions. Higher baseline weight/BMI and being GLP1RA naïve were associated with larger weight reductions.

Conclusion: In this real-world study, baseline HbA1c and weight are predictors of the respective outcomes following initiation of Semaglutide. Additionally, individuals who are younger may get more glycaemic benefit from Semaglutide. Individuals switching to Semaglutide from alternative GLP1RAs had smaller additional HbA1c and weight reductions. Our data mirror existing randomised control trial data and may have implications in view of current supply issues. Further evidence over a longer follow-up period is being collected.

Acknowledgements: Additional Authors: Dr D Barnes – Tunbridge Wells Hospitals, Maidstone and Tunbridge Wells NHS Trust, Maidstone, UK Dr N Larsen – Department of Diabetes and Endocrinology, Nottingham University Hospitals NHS Trust, University Hospitals of Derby and Burton NHS Trust.

Clinical care and other categories posters: Inpatient care

P225 | 'Start with the diabasics': An initiative to raise the profile of inpatient diabetes for non-specialist staff

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Background: High prevalence of inpatients with diabetes in our hospital makes it challenging for the specialist team to see all referrals promptly. There have been errors and near misses around diabetes care, with other teams not always following guidelines, but deferring decision making to us, reducing time for where the clinical need is more pressing. The increasing need for patient support, even in the diabetes team's absence meant that something had to change.

Aims: The aim of the study was to define the minimum standards of diabetes care, ensuring that issues around diabetes management evoke an urgent response from other teams to act themselves.
Method: As one of two teams supported by the Diabetes UK 'Health Systems Change Team', we devised an improvement project. We met them between June 2022 and March 2023, exploring factors to drive change and sought feedback from staff and people with diabetes, resulting in our 'Start with the Diabasics' initiative.
Results: Since initiative launch, referral numbers have fallen by 10%–20% and the reason for diabetes review is increasingly clear. There is no evidence of reduced referral rates associated with persistent hyperglycaemia or hypoglycaemia. There is evidence that teams have acted themselves and contact us to check their approach more, rather than expecting us to always act first. This initiative was a 2023 Diabetes Quality-in-Care awards finalist.
Conclusion: Creating a diabetes brand, through being inclusive and using a systems-based approach, to formally outline clinical responsibilities for all staff here, has improved the visibility and urgency around the need for all to support diabetes care.

P226 | Clinical audit of people with type 1 diabetes admitted to hospital

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Introduction: People admitted to hospital with diabetes are more likely to die than those without. Continuous glucose monitoring (CGM) reduces risk of hospitalisation. Admission offers opportunity to review high risk patients/offer interventions.
Aims: Audit CGM uptake in people with type 1 diabetes admitted to hospital, accuracy of recorded diagnosis, specialist team review and acute complications.
Methods: Data collection: single day once a week (4 weeks). Patient identification: automated retinal screening data and SystmOne (S1). Audit data: hospital electronic patient record (EPR).
Results: Thirty-five patients, mean age 56 year (range: 24–87 year), 51% female, 89% diabetes diagnosis on EPR, 63% additionally coded type 1 diabetes (66% EPR diagnosis matched S1). Of 32 patients (data unavailable: $n = 3$) 31 offered/using CGM (23 Flash CGM, 4 previously offered – declined/not using, 1 DexcomG6, 2 offered during admission – declined, 1 offered during admission – accepted) 1 not offered. 42% experienced severe hypo (<3.0 mmol/L) at least once (range: 1–6 episodes). 65% had anticipatory hypo treatment prescribed. Two patients developed DKA. Specialist team review: 77% patients. Self-administration of medicines (SAM) assessment completed for 17%, of those 83% self-administering (6% with no SAM assessment also self-administering).
Summary: Admission documentation of type 1 diabetes was poor. Access to CGM prior to admission was good. Three quarters not using CGM offered on admission. Almost half of patients experienced at least one severe hypo, two patients developed DKA during admission. Three-quarters reviewed by specialist team, implementation of SAM poor. Development of electronic risk scores would identify high risk inpatients with diabetes allowing proactive intervention.

P227 | Diabetic ketoacidosis (DKA) in the post-Covid-19 era: Increased delays in diagnosis and patients transfer to ward reduced compliance to national Scottish diabetic ketoacidosis care pathway

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Aim: DKA is managed in our trust using the national Scottish DKA care pathway, involving treatment pathways from 0 to 4h and from 4h until discharge[1]. Locally, patients with DKA present to the emergency department or acute medicine unit before being transferred to general medicine wards, with only severe cases treated within critical care. As with most of the UK, the local emergency departments face increasing delays in transferring patients to inpatient beds[2,3]. This project aims to investigate the effect of these delays on DKA protocol compliance.
Methods: Data on DKA protocol compliance were gathered in a general medicine ward, using patient notes. Analysis was conducted using Microsoft Excel.
Results: Fifty-two pre-Covid-19 (February 2017–January 2019) cohort patients and 65 post-Covid-19 (August 2022–October 2023) cohort patients were included. Median time from presentation in admission unit to diagnosis increased from 28 mins pre-Covid-19 to 49 mins post-Covid-19. Patient transfer from admission units to ward was delayed from 3 h 37 mins (median) with protocol compliance of 86% pre-Covid-19, to 8 h 21 mins (median) with protocol compliance of 77% post-Covid-19. Delay with transfer to ward was associated with reduced protocol compliance rates as follows: <4h (pre-Covid-19: 82%, post-Covid-19:

92%), 4–8h (pre-Covid-19: 86%, post-Covid-19: 79%) and >8h (pre-Covid-19: 78%, post-Covid-19: 71%).

Conclusion: There were increased delays in diagnosis and patient transfer from admission units to wards post-Covid-19, likely due to increased admission unit waiting times and bed pressures[2,3]. Compliance to the Scottish DKA protocol has declined with these delays, directly impacting on patient care.

Reference:

(1) Diabetic ketoacidosis care bundle. NHS Scotland, 2010. (2) What's going on with A&E waiting times? London: Kings Fund, 2022. (3) A&E activity and waiting times. Edinburgh: Public Health Scotland, 2023.

P228 | Routine investigation of diabetes-related hospital incidents is a valuable tool to improve inpatient diabetes care

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Introduction: The NHS is maximising focus on learning from patient safety events. The inpatient diabetes team conducted a pilot study at our hospital aiming to use local incident reporting, investigation and escalation structures to improve inpatient diabetes care.

Methodology: From April to October 2023, our hospital governance team provided access to incidents pertaining to inpatient diabetes care reported on DATIX risk management information system. We reviewed the reports, examined electronic patient records and interviewed staff to investigate the incidents.

Results: We were notified of 44 incidents, with a specific request to investigate certain incidents (amounting to 50% of incidents). 100% were investigated by us. Majority of incidents were prescribing errors (28%), Variable Rate Insulin Infusion (VRII) protocol errors (18%), Diabetic Ketoacidosis (DKA) protocol errors (14%) and medication administration errors (14%). 55% of reported errors occurred in the accident and emergency department. 11% of incidents led to moderate harm. Lessons learned that had trust-wide applicability were (1) need for a diabetes-specific patient transfer policy addressing intravenous (IV) insulin administration during transit (2) need to support agency staff with VRII training and two nurse checks for insulin administration. It clarified that our immediate area of focus for upskilling staff was the acute floor. Measures we took to support teams reporting errors included discussing incidents and the associated learning in local governance meetings and offering clinical and pastoral support to ward managers and staff in areas where incidents occurred.

Conclusion: routinely investigating incident reports offers valuable insights into gaps, and therefore improvement opportunities, in inpatient diabetes care.

P229 | Reducing diabetes-related clinical incidents in an inpatient setting in a South London district general hospital

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Aims: Diabetes-related incidents were higher than average in the inpatient diabetes ward in the hospital which cared for patients with diabetes admitted due to a range of different conditions. The mean number of incidents was 1.3 per month between January 2022 and December 2022. We aimed to.

- Improve diabetes knowledge among nurses and healthcare assistants (HCA) on this ward.
- To reduce the number of diabetes-related clinical incidents on this ward by 50%.

Methods: Baseline data of diabetes knowledge was collected from the nurses and HCA using a 20-point questionnaire.

A 9-week structured training program was devised and delivered by the diabetes team (specialist nurse, dietitian, podiatrist) in January 2023.

All modules were stored and a training tool was set up for the ward nurses to have continuous local education.

Diabetes knowledge was reassessed using the same questionnaire.

Data on the number of diabetes related incidents were collected from January 2022 to May 2023.

Data were analysed using Microsoft excel.

Results: Mean score of diabetes knowledge was 65.5% before the teaching sessions were attended, this improved to 83.2% after teaching sessions.

The number of diabetes related incidents reduced to 0 incidents from a mean of 1.3 incidents for 5 consecutive months since role out of the teaching session.

Conclusion: Structured education among non-specialist nurses and HCAs increased their diabetes knowledge and reduced diabetes-related incidents in an inpatient setting.

P230 | Change in demographic profile of inpatients in relation to diabetes over a 20-year period

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Introduction: Prevalence of diabetes is increasing. How the demography is changing over a long term for inpatients with and without diabetes is not clear in the UK.
Method: We looked at admission data for patients admitted with a primary and secondary diagnoses of diabetes and all medical patients admitted to Royal Bolton Hospital from January to December 1999, 2009 and 2019.
Results: The total number of patients admitted in these 3 years were 12,827, 25,290 and 70,458. The mean age was 62.8, 61.8 and 52.7 years. The M:F ratios were 1.04, 0.97 and 0.55 respectively. Percentage of patients being admitted with diagnosis of diabetes was 3.5%, 4.2% and 2.6%. The mean age of inpatients with diabetes were 64.1, 66.5 and 54.8 years. The number with primary diagnosis of diabetes were 94, 186 and 213, while the number with a secondary diagnosis of diabetes were 352, 885 and 1617 respectively. The number of inpatients over the age of 100 years were 6, 15 and 28, respectively, and none of them had diabetes.
Conclusion: There has been a significant rise in the total number of inpatients over the 20 year period. There has been a drop in the percentage of patients with diabetes needing admission over this period, though their total numbers have been rising. The reduction in the mean age of admission may correlate to rise in the number of patients with diabetes at a younger age and the overall reduction in disability free life years.

P231 | Burden and mortality among inpatients with diabetes foot disease

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Aims: Diabetes foot ulceration and complications are a significant cause of hospitalisation. We sought to determine the burden of inpatient diabetes foot disease and get an overview of their management.
Methods: Retrospective observational study of consecutively reviewed inpatients by the multidisciplinary diabetes foot team (MDFT) (diabetologist, podiatrist, vascular and orthopaedic surgeon) over 12 months. Data collected included baseline characteristics, referral reason, overview of management and in-hospital mortality.
Results: There were 365 referrals to the MDFT in 295 patients {mean age (SD)}, 70.1 (14.1) years. In only 18.1% episodes, the hospital admission was for diabetic foot disease. Time between referral to review by the MDFT was 2.1 (3.4) days. Common reasons for referral were foot ulceration (74.5%) and osteomyelitis (28.9%). Dry and wet gangrene were present in 12.7% and 8.5% respectively. Antibiotics were prescribed in 65.4% episodes. Orthopaedic and vascular surgical review was needed in 30.3% and 29.6% episodes respectively. Surgery was performed in 60 episodes {debridement ($n=41$), incision and drainage ($n=11$), minor amputation ($n=27$), major amputations ($n=5$)}. Outpatient parenteral antibiotic treatment was arranged on discharge in 17.8% and 6.8% were transferred to vascular surgical hub site. Mortality among all patients referred to the MDFT was 17%, during the index admission and 31.3% died in the next 24 months.
Conclusion: A robust pathway for inpatient multidisciplinary diabetes review is needed, as there is a high prevalence of diabetes foot disease among inpatients admitted with other medical diagnosis. Optimisation of modifiable risk factors is important as these patients have a high mortality.

P232 | Promoting safe use of insulin within Barts Health NHS trust through improvement initiatives

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Background: There is a high prevalence of inpatient insulin incidents causing harm (4605 via NaDIA). In order to improve insulin safety, a trustwide Committee was convened at Barts Health.
Objectives: The objective of the study was to reduce insulin-related serious untoward incidents (SUI's), diabetic ketoacidosis (DKA), hyperosmolar hyperglycaemic state (HHS) and severe hypoglycaemia in inpatients.
To improve education for all clinical staff across Barts Health.
Methods: The Committee created an insulin incidents dashboard to monitor the number of incidents and identify key themes. This was analysed monthly.

Results: The number of reported SUI's reduced from 2 in 2022 to 0 in 2023. DKA, HHS and severe hypoglycaemia incidents have been static in 2023.
The uptake of an insulin safety training module for all healthcare staff, has been monitored monthly (April–November 2023). Due to promotion of the module during the annual Insulin Safety week and dissemination of regular reminders, the uptake has increased (2022: 335 staff vs January–July 2023: 744 staff).
The Committee have worked with the trust to have an insulin safety module as a mandatory module for all clinical staff and facilitated innovative education through 'sugar bites' (monthly bite sized emails) to all clinical staff. In addition, implementation of a new notification system on hospital electronic records as well as development of trustwide policies and guidelines.
Conclusion: The insulin safety committee has improved insulin safety across Barts Health, with 0 SUI's over the last 12 months. It has also led to a better understanding of the causes of insulin related incidents and improved awareness of insulin safety among clinical staff.

P233 | Role of inpatient diabetes care team in SGLT2 inhibitor (SGLT2i) safe usage and management education: A large tertiary hospital, single centre experience

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Aim: SGLT2i is becoming increasingly popular treatment for people with and without type 2 diabetes. Therefore, increasing emphasis should be given to inpatient sick-day-rule management of SGLT2i usage during emergency admissions, and the appropriate support to both patients and staff.
Method: Proactive case-finding service improvement study was conducted over a 60-day period in 2023, to identify patients with suboptimal SGLT2i prescribing and sick-day-rule precautions and provide education support to both patients and ward staff.
Result: NNUHFT is a 1400 bed-base tertiary hospital, with almost 10,000 admissions involving patients with people with diabetes annually. Each day, approximately 250 beds are occupied by adult patients with people with diabetes; 80% has type 2 diabetes. About 50 inpatient per day were treated with SGLT2i: 70% for type 2 diabetes, 30% for heart failure (HF) and/or chronic kidney disease (CKD).
Total 25 events were identified between 01/06/2023 and 31/07/2023: 80% ($n=20$) were male; mean age was 78 years; 52% ($n=13$) prescribing indication was for type 2 diabetes, 48% ($n=12$) for HF and/or CKD.
64% ($n=16$) continued to receive SGLT2i despite being acutely unwell. 56% ($n=14$) did not received sick-day-rule education in either primary and/or secondary care. 64% ($n=16$) were elderly age >75, 48% ($n=12$) with significant frailty, 12% ($n=3$) has HbA1c >86 mmol/mol, 20% ($n=5$) without HbA1c measured within past 3 months.
60% ($n=15$) continue to receive SGLT2i despite acute kidney injury (AKI).
20% ($n=5$) was initiated SGLT2i either contraindicated and/or without full sick-day-rule counselling.
16% ($n=4$) developed in-hospital ketosis, diabetic ketoacidosis, and/or Fournier's gangrene.
Summary: Our study data supports inpatient diabetes teams' important role in SGLT2i usage safety and education for both patients and staff in inpatient, outpatient and primary care.

P234 | Diabetes virtual ward (VW) in acute emergency services facilitates early hospital discharge

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Aims: Diabetes VW allows people with diabetes who would otherwise be in hospital to be cared for at home via a diabetes-specific digital platform linking glucose meter data to an app that is remotely reviewed by diabetes VW team. Our aims are to avoid admission and reduce length of stay (LoS).
Methods: VW patients are referred from acute emergency services via existing referral pathway to diabetes specialist nurses (DSNs). They are assessed by DSNs for eligibility to onboard onto VW before hospital discharge. Roche Diabetes Care Platform with a complementary glucose-meter-to-app set up was used to remotely share home glucose monitoring with diabetes VW team. People with existing continuous glucose monitoring devices were onboarded VW via Libre View or Dexcom Clarity app. VW DSNs carried out daily telephone consultation for medication titration and self-management education. Pathway-specific patient outcome measures were collected.
Results: Of the 170 eligible patients, 162 patients were onboarded onto diabetes VW from December 2022 to May 2023. Admissions onto VW lasted on average less than 14 days. Onboarded people aged between 18 and 94 and 95% people were able to use the digital platform. One patient

with diabetes-unrelated (COPD exacerbation) and one with diabetes-related (hyperglycaemia) re-admissions were recorded. LoS was reduced by two bed days. Early discharge savings from the LoS effects was calculated as £2240 per week.

Conclusion: Diabetes VW provides intensive DSN support following diabetes-related hospital admissions and gives people with diabetes the skills and motivation to manage their diabetes in the unique context of their own lives.

Clinical care and other categories posters: Insulin: Actions, metabolism and therapy

P235 | Comparing hybrid closed loop (HCL) insulin delivery systems to antecedent systems in the treatment of type 1 diabetes: A systematic review and meta-analysis

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Background: Studies have reported that HCL systems achieve better glycaemic control while decreasing the cognitive load on managing type 1 diabetes. However, due to the cost and limited experience, they are currently not recommended as first-line treatment for type 1 diabetes.

Aims: A systematic review to investigate whether HCLs have improved efficacy when compared with antecedent strategies in adults and children with type 1 diabetes.

Methods: We searched EMBASE, MEDLINE and Cochrane library, from inception to 13th October 2022 to include 19 studies. The primary outcome was percentage time in range (TIR) (3.9–10.0 mmol/L) of plasma glucose and secondary outcomes were mean glucose levels (mmol/L) and percentage time below range (TBR) (<3.9 mmol/L).

Results: Despite a substantial overall heterogeneity ($Q = 69.61$, $I^2 = 74\%$, $p < 0.00001$), HCL improved TIR compared to controls by 11.55% (95% CI 9.46, 13.64; $p < 0.00001$). Secondary outcomes showed a reduction in both mean glucose levels by 0.74 mmol/L (95% CI −0.94, −0.53; $p < 0.00001$) and TBR by 0.97% (95% CI −1.41, −0.54; $p < 0.00001$) in HCLs compared to controls. However, there were substantial overall heterogeneities for the secondary outcomes; mean glucose levels ($Q = 72.17$; $I^2 = 75\%$; $p < 0.00001$) and percentage TBR ($Q = 76.14$; $I^2 = 76\%$; $p < 0.00001$).

Conclusion: HCLs are more effective than antecedent therapies in optimising glycaemic control in patients with type 1 diabetes. However, there is a high degree of heterogeneity of impact and further research with more representative type 1 diabetes populations are required to assess the most cost-effective strategy.

Clinical care and other categories posters: Lipids and fatty liver

P236 | The real-world impact of treatments for type 2 diabetes on outcomes in people with non-alcoholic fatty liver disease

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Refer to Oral number A26.

Clinical care and other categories posters: Monitoring

P237 | Inpatient glucose targets do not improve glucose control in non-critically ill patients with diabetes

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Aims: A documented blood glucose target range may improve safety and promote optimal clinical outcomes in hospitalised patients with diabetes. There is limited evidence exploring inpatient blood glucose target ranges in non-critically ill patients with diabetes. We hypothesised that early documentation of glucose target range on hospital admission would increase the number of in-range target readings and reduce the incidence of hypoglycaemia.

Methods: Patients with diabetes admitted to Acute Medicine to at Charing Cross Hospital, London, UK in January and March 2023 were included in this quality improvement project. Inpatient blood glucose targets (6–10 mmol/L or 8–15 mmol/L according to clinical status) were prospectively documented within the electronic patient

record on admission ($n=93$, March) and glucose metrics compared to a data set without prospective glucose targets ($n=136$, January) in whom a retrospective glucose target was applied.

Results: There was no significant difference between the March cohort with prospective documentation of blood glucose target range and the January cohort with no documentation in the percentage of in-range glucose readings [44.4% vs 45.7%, $p=0.86$] or the percentage of hypoglycaemic readings [2.38% vs 2.79%, $p=0.92$].

Conclusion: Early documentation of inpatient glucose targets did not increase the number of in-range target readings or decrease the incidence of hypoglycaemia. This may reflect a lack of evidence-based glucose targets, inadequate number of participants, difficulty achieving target range glucose levels in some patients. Future studies should pair staff and patient education with application of inpatient target blood glucose ranges for people with diabetes.

P238 | Understanding the variability of surrogate, glycaemic markers HbA1c and fructosamine, at diabetes cut-off/action points using graphs against random plasma glucose

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Aims: HbA1c and fructosamine are complementary, surrogate glycaemic markers; HbA1c recommended for diagnosis/management/confirmation of remission of type 2 diabetes, fructosamine (not widely available) for management when HbA1c inappropriate. Their relationships are presented graphically against random plasma glucose, widely available in secondary care as patients do not generally present fasting.

Methods: Participants were recruited at outpatient, diabetes clinics for a research study on glucose fructosamine and HbA1c, ($n=129$). Blood was collected into fluoride oxalate vacutainers for glucose (*diabetes >11.0 mmol L−1*), HbA1c measured by ion exchange, high performance liquid chromatography (*≥48 mmol mol−1*) and fructosamine on automated analysers (*>285 μmol L−1*).

Results: Participants had a median age of 60 years (median IQ range 50–71) with 86 (69%) male; 94 (75%) White European, 16 (13%) South Asian, 10 (8%) Afro-Caribbean, 5 (4%) other ethnic groups. Random plasma glucose was 7.3 (5.3–11.5), HbA1c 61 (52–70) and fructosamine 305.0 (268.0–354.5); red blood cell count 4.7 (4.3–5.0)$\times 10^{12}$ L^{-1} and mean cell volume 86 (83–89) fL within reference ranges, ($n=125$). Linear regression equations were HbA1c = 1.8 × Glucose + 46.5, r^2 0.30; Fructosamine = 8.2 × Glucose + 248.3, r^2 0.28, ($n=129$). But these equations do not illustrate the scatter at 11.1 glucose – HbA1c equated to 67 ranging from 42 to 91 and fructosamine 339 from 223 to 455. Fructosamine was depressed in presence of proteinuria/higher microalbuminuria levels.

Conclusion: Consideration of this variability related to haemoglobin and albumin turnover assists when interpreting these surrogate markers, managing diabetes and identifying people for whom they are unsuitable.

Acknowledgement: Diabetes Translational Research Group (DTRG).

P239 | County wide real-world utility of flash glucose monitoring in a community nurse-dependent insulin-treated population with type 2 diabetes

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Aim: Real-world pilot of flash glucose monitoring in an adult population with type 2 diabetes requiring daily support from community nursing teams with diabetes management.

Methods: NHS England supported evaluation of the utility of Freestyle Libre in a community-dependent diabetes cohort. Specialist Nurses supported fitting of sensors and education of consented patients, carers and district nurses. Demographics, glycaemic data, insulin frequency and daily dose, district nurse visit frequency and emergency hospital utilisation were compared from before and after clinically appropriate adjustments.

Results: $n = 143$ patients, mean age 81 years, Female 59%, mean duration on pilot 5 months. Baseline and review (brackets) characteristics – HbA1c 72 mmol/mol (65 mmol/mol); glucose time in range 60% (61%); glycaemic management index 60 mmol/mol (57 mmol/mol).
Insulin changes at review as a consequence of the available Libre data: 15% of patients stopped insulin, 15% had a reduced insulin dosing frequency, 8% had a preparation change with the same dosing frequency. 20% of patients had total daily dose adjustments of >20%.
Daily insulin injection frequency at baseline and after evaluation (brackets) – zero daily 1% (16%), once daily 52% (51%), twice daily 36% (24%), three times daily 6% (4%), four times daily 6% (4%).
At 30 min per visit, district nurse full time equivalent requirement per 100 patients/week – 14.3 at baseline, 7.6 at review. There was a reduction in emergency department attendances and hospital admissions.
Conclusion: The use of flash glucose monitoring in a community-dependent diabetes population enabled safe rationalisation of insulin regimes releasing valuable community nursing time while improving patient safety and avoiding hospital and emergency attendances.

Clinical care and other categories posters: Nephropathy

P240 | Diabetes in-reach service for people with diabetes on haemodialysis (HD) improves knowledge of diabetes and glycaemic control

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Aims: The aim of the study was to evaluate knowledge of diabetes and glycaemic control in people with diabetes on HD before and after Education to Protect Tomorrow (E2PT), a quality improvement project that provides diabetes specialist nurse (DSN) in-reach service to a dialysis centre.
Methods: Ten people who attended in-centre HD and were transplant wait listed but not under specialist diabetes care were randomly selected. Patients' knowledge of diabetes was evaluated using the validated Diabetic Knowledge Questionnaire (DKQ) before and after E2PT. Intermittently scanned continuous glucose monitoring (isCGM) using Freestyle Libre 2 were initiated during the patients' dialysis sessions by the DSN and continued for the duration of E2PT. Review of the isCGM data and diabetes treatment, education on self-management of diabetes, diet and lifestyle advice were provided during weekly point of contact for 16 weeks on the dialysis unit.
Results: People's knowledge of diabetes has improved following E2PT. The percentage of correct answers on the DKQ at baseline ranged from 26% to 85%. At end point, all 10 patients achieved scores of correct answers >90%. Two of them scored 100% at the end of study. Percentage time in range (3.9–10.0 mmol/L) was also significantly improved from baseline (46.1 [30.5–91.3]%) to end point (63.3 [60.6–95.3]%; $p = 0.013$) with no significant differences in hypoglycaemia (<3.9 mmol/L; $p = 0.919$).
Conclusions: Our diabetes in-reach service provides a patient-centred, collaborative care approach to people with diabetes on haemodialysis and has shown to improve their knowledge of diabetes and glycaemic control.

P241 | Predicting end-stage kidney disease in an ethnically diverse cohort of 7296 people with type 2 diabetes and chronic kidney disease: An external validation of kidney failure risk equation (KFRE)

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Refer to Oral number A7.

Clinical care and other categories posters: Neuropathy

P242 | The potential benefits of hybrid closed loop (HCL) in people with type 1 diabetes with gastroparesis: A case series

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Introduction: Upcoming NICE guidelines advocate for the use of HCL in the management of type 1 diabetes with

above target HbA1c levels, a major cause of gastroparesis. We report three cases of people with type 1 diabetes and gastroparesis, on HCL.

Case 1: Forty-three-year-old female diagnosed with type 1 diabetes in 2004 and gastroparesis in 2015. Percutaneous gastro-jejunostomy (PEG-J) inserted 2017 and on maximum tolerated prokinetics. 16 hospital admissions for vomiting and ketoacidosis in 2 years pre-HCL. Commenced Control-IQ in 2019 and with two admissions since, both due to constipation. Her gastroparesis symptoms have improved significantly. HbA1c decreased from 115 mmol/mol to 57 mmol/mol. Time in range (TIR, 3.9–10 mmol/L) increased from 15% to 49% with 0% time below range (TBR).

Case 2: Fifty-one-year-old female diagnosed with type 1 diabetes in 2012 and gastroparesis in 2020; PEG-J inserted 2020. 40 hospital admissions for gastroparesis and ketoacidosis 2 years – only one admission since HCL started in 2022. Significant improvement in gastroparesis symptoms. HbA1c has reduced from 141 mmol/mol pre-HCL to 103 mmol/mol; current TIR 47% and TBR 0%. GMI on closed loop recently 56.8 mmol/mol.

Case 3: Forty-three-year-old female diagnosed with type 1 diabetes in 1992 and gastroparesis in 2020 contributing to recurrent severe hypoglycaemia (SH) and impaired awareness of hypoglycaemia (IAH). Commenced HCL in 2023: No further SH and improved IAH (Gold score 7 down to 2). Impact on HbA1c yet to be seen, 58 mmol/mol at commencement. No hospital admissions. Current TIR 43%, TBR 0%. Gastroparesis symptoms still persist despite HCL.

Conclusion: HCL was associated with improved glucose outcomes and in two cases reduced hospital admissions and improved gastroparesis symptoms. Further work is needed to explore the impact of HCL on both glucose levels and especially gastroparesis symptoms in a clinical trial setting.

P243 | Sensory adaptations to vibrating insole system in people with diabetic peripheral neuropathy: A randomised cross-over clinical controlled trial

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Refer to Oral number A69.

Clinical care and other categories posters: New technology, therapies and treatment

P244 | HbA1c and sensor glucose-level changes with hybrid closed loop (HCL) therapy in the real world: 12-month results from the ABCD audit of the NHS England closed loop pilot in adults

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Introduction: The NHS England pilot launched in 2021 and funded access to HCL therapy for individuals using

pump therapy, FreeStyle Libre 2 and with a HbA1c ≥ 69 mmol/mol. Six-month results demonstrated improvements in HbA1c and sensor glucose levels. We report longer-term follow-up from the cohort.

Methods: HbA1c and sensor glucose data at 12 months (9–18 months) follow-up are reported. Multivariate linear regression analysis was used to assess changes from baseline (corrected for covariates) in Stata 16.

Results: Data were available for 214 (out of 520) individuals at 12 months from the pilot, with mean ± SD age 41.1 ± 14.0 years, diabetes duration 17.4 ± 17.4 years, baseline HbA1c 78.2 ± 12.5 mmol/mol and weight 83.1 ± 18.1 kg. In total, 63.6% were female and 93.2% were White. Mean ± SD follow-up time was 12 ± 2.4 months.

Mean ± SD HbA1c was 78.2 ± 9.7 mmol/mol reducing to 63.2 ± 11.9 mmol/mol at 12-months. This is a decrease in 16.7 mmol/mol (95% CI 15.1–18.3; $p < 0.001$) by 12-months compared to baseline when corrected for covariates. At 12 months, time-in-range increased from 37.9% to 62.9% and time >13.9 mmol/L decreased from 33.6% to 12.9%. When corrected for change in covariates this was a mean difference of +23.5% (95% CI 20.0–27.0; $p < 0.001$) and −19.6% (95% CI 15.3–23.9; $p < 0.001$) respectively. Time below range (3–3.8 mmol/L) reduced by 0.8% (95% CI 0.1–1.5; $p = 0.04$) and time <3 mmol/L reduced by 0.3% (95% CI 0.1–0.5; $p = 0.01$). HbA1c and sensor glucose outcomes were not significantly different between 6 and 12 months.

Discussion: Significant HbA1c reductions and improvements in sensor glucometrics are seen with HCL, sustained to 12-month follow-up. Data collection will continue in the long term to assess whether these positive outcomes are maintained.

Acknowledgement: On behalf of all ABCD closed loop audit contributors.

P245 | EndoBarrier treatment for longstanding type 2 diabetes and obesity: Outcomes 2 years after EndoBarrier in 90 consecutively treated patients

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Aims: EndoBarrier is a 60 cm duodenal-jejunal bypass liner endoscopically implanted for up to 1 year. It mimics the by-pass part of Roux-en-Y bariatric surgery. We aimed to assess the safety and efficacy of EndoBarrier in patients with suboptimally controlled diabesity.

Methods: Between July 2013 and November 2017, we implanted 90 EndoBarriers in a single centre with all removed by November 2018. Outcomes were monitored in a registry.

Results: All 90 patients have completed 2-years post EndoBarrier removal and, of these, 60/90 (66%) (age 51.2 ± 8.3 years, 47% male, 50% White ethnicity, diabetes duration 11 (6.0–18.5) years, 60% insulin-treated, BMI 41.5 ± 6.8 kg/m^2) attended follow-up. During EndoBarrier implantation, mean ± SD HbA1c fell by 19.6 ± 19.0 mmol/mol, from 77.9 ± 19.5 to 58.3 ± 13.5 mmol/mol ($p < 0.001$), weight by 16.7 ± 8.4 kg from 120.0 ± 28.2 to 103.4 ± 28.7 kg (<0.001), systolic BP from 138.8 ± 14.8 to 127.9 ± 17.5 mmHg (<0.001), cholesterol from 4.9 ± 1.2 to 4.0 ± 0.9 mmol/L ($p < 0.001$) and serum alanine-aminotransferase (marker of liver fat) from 31.1 ± 17.5 to 19.3 ± 10.3 U/L ($p < 0.001$). Median (IQR) total daily insulin dose reduced from 100 (49–159) to 37 (0–64) units ($p < 0.001$). 10/36 (27.8%) insulin treated patients discontinued insulin. Two-years post-EndoBarrier 32/60 (53%) demonstrated fully sustained improvement, 16/60 (27%) partially sustained improvement and 12/60 (20%) reverted to baseline. Of those deteriorating, 11/12 (92%) had depression and/or bereavement and/or major health problem. 13/90 (14%) patients required early EndoBarrier removal: five gastrointestinal haemorrhage, two liver abscesses, one other abscess and five gastrointestinal symptoms. All made a full recovery most experienced benefit despite the complication.

Conclusion: Our data demonstrate EndoBarrier as highly effective in patients with refractory diabesity, with the maintenance of significant improvement 2 years after removal in 80% of cases. As an endoscopic procedure it is relatively straightforward and non-invasive, and it deserves further investigation.

P246 | Changing Do-It-Yourself Artificial Pancreas Systems (DIY APS) to commercial hybrid closed loop (HCL) systems: Experiences from a tertiary centre

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Aims: The aim of the study was to examine the impact of changing DIY APS to commercial HCL systems on glycaemic outcomes in people with type 1 diabetes.

Methods: We evaluated the care of people with type 1 diabetes who moved from DIY APS to commercial HCL systems at a major tertiary diabetes technology centre in the UK. Data were collected from patient electronic care records according to Caldicot principles. When lab HbA1c was not available, sensor HbA1c concentrations were extracted. Analysis was performed using SpSS 21.0.
Results: Out of 21 people on DIY APS at University Hospitals of Derby and Burton, 23.8% ($n=5$) were transferred to a commercial HCL system (60% females, mean ± SD age was 40.6 ± 10 years and diabetes duration 27.0 ± 13.3 years). The reasons for changing to HCL included disabling hypoglycaemia ($n=2$), patient preference ($n=2$) and sensor alarm burden ($n=1$). Compared with DIY APS, HCL resulted in no difference in HbA1c (50.2 mmol/mol vs 51.2 mmol/mol), time-in-glucose range (69% vs 71%), time-above-glucose range (26.6 vs 26.8) and hypoglycaemia awareness (Gold score; 2 vs 1) ($p>0.05$ for all) after a median follow-up of 7 months (range 4–17 months). Time-below-glucose range (TBR) was significantly reduced after changing from DIY APS to commercial HCL (4.4% vs 2.2%, $p=0.04$).
Conclusions: Besides TBR, no other changes in glycaemic outcomes were observed in our cohort after changing DIY APS to commercial HCL. Our data suggest that people on DIY APS with disabling hypoglycaemia could benefit from commercial HCL systems.

P247 | Performance of the GTT@home oral glucose tolerance test kit in gestational diabetes

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Refer to Oral number A2.

P248 | Early results from Omnipod 5 hybrid closed loop system: A prospective real-world study in individuals affected by type 1 diabetes

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Background: Recent strides in diabetes management have introduced the Omnipod 5 insulin pump, a tubeless automated insulin delivery system. This real-world study seeks to comprehensively evaluate the performance, safety and user contentment of this system.
Aims: This study aimed to evaluate changes in indicators of glucose control in individuals with type 1 diabetes commenced on the Omnipod 5 system.
Methods: A cohort comprising 20 participants were selected for this prospective, single-arm study. Baseline demographic and clinical data was documented, followed by the provision of the OMNIPOD 5 insulin pump. Continuous glucose monitoring data, encompassing time in range (TIR), coefficient of variability (CoV), average glucose, glucose monitoring indicator (GMI), hypoglycaemia occurrence and patient experience were studied prior to and 4 weeks post-commencement of Omnipod 5 insulin pump.
Results: Participants experienced notable escalations in TIR from 50% to 69.8% (mean increment of 22.4%), CoV reduced from 37.2% to 34.2% (average reduction of 6.9%), GMI reduced from 60.2 mmol/mol to 54.4 mmol/mol (average reduction of 8.3 mmol/mol). Furthermore, frequency of hypoglycaemic incidents was reduced from 3% to 1.2%. Majority of the users reported ease of use and heightened quality of life.
Discussion: The findings of this study affirm that Omnipod 5 system results in early and substantive improvements in glycaemic control, glucose variability, in addition to achieving positive user experiences. The tubeless configuration and advanced algorithmic framework contribute to its efficacy in automating insulin administration. It is imperative that further investigations involving a broader demographic stratum be pursued to validate and consolidate these findings.

P249 | Factors predicting achievement of recommend time-in-range and HbA1c at 12 month post-commencement among closed loop users with elevated baseline HbA1c levels

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Refer to Oral number A27.

P250 | Qualitative study exploring the experiences of hybrid closed loop systems in people with type 1 diabetes and their partners

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Refer to Oral number A61.

P251 | Assessing the relative importance of glycaemic features predicting inpatient hypoglycaemia using a machine learning model

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Aims: Inpatient hypoglycaemia may occur for a multitude of clinical reasons, which often requires electronic health record analysis to determine. We aimed to investigate the features identified as important in the prediction of future hypoglycaemic events during hospital admissions, using capillary blood glucose (CBG) data without linkage to electronic health records.
Methods: XGBoost models were trained to predict the probability of CBG of <4 mmol/L. The training data set comprised inpatient CBG measurements 01 January 2010–01 April 2022 within a large health board. Models were generated predicting hypoglycaemia on days 2 to 31 of admission. Characteristics of Days 2 and 7 models are described. Feature importance data were extracted from the trained model. Weight (the number of times a feature is used to make decisions) and gain (the average contribution of a feature to the final prediction) were examined. Summary CBG characteristics per day of admission prior to the prediction window were taken as input features, in addition to age and sex.
Results: Day 2 ($n = 42{,}871$): Examining gain, the most impactful features were measures of minimum and average glucose in Day 1; with age the most impactful feature by weight. Day 7 ($n = 20{,}842$): most impactful features by gain were minimum CBG in the 48h prior to prediction, glycaemic variability and trend. Examining weight, measures of variability throughout the admission are important.
Conclusions: Our findings demonstrate that trained machine learning models identify individuals with features of extreme and variable CBG measurements to be at highest risk of future hypoglycaemia.

P252 | Predicting adult inpatient hypoglycaemia events: The development and validation of a novel machine-learning model

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Aims: Inpatient hypoglycaemic events are associated with increased morbidity and mortality. Machine- learning models aiming to predict hypoglycaemic events often use multiple patient related variables and have limited validation. We demonstrate our machine learning model's effectiveness in predicting inpatient hypoglycaemic events using capillary blood glucose alone (CBG) through internal validation.
Methods: An XGBoost based model was trained to predict the probability of a measured CBG of <4 mmol/mol in the following 24 h period, for each day of the patient's admission. Optimum hyperparameters were identified via Bayesian Optimisation. The performance of the models was analysed using 10-fold cross-validation, area under

the ROC curve (AUROC) and area under precision recall curve (AUPRC). We present our model's performance at predicting hypoglycaemic events at day two and day seven from admission, with thresholds of 0.27 and 0.14 respectively.

Our model was retrospectively trained on an inpatient data set between January 2009 and May 2022 ($n = 259,274$ patients, providing 4,758,149 rows of CBG information). We used 10-fold cross validation to internally validate the model on a separate data set collected from May 2022 to September 2023 ($n = 79,353$ patients, providing 12,38,913 rows of CBG information).

Results: The model used to predict hypoglycaemic events on day two of admission had an internal cross-validation AUROC of 0.80 and an AUPRC of 0.43. The day seven model demonstrated an internal cross-validation AUROC of 0.85 and AUPRC of 0.36.

Conclusions: Our machine-learning model demonstrates excellent performance at predicting inpatient hypoglycaemic events occurring in inpatient admissions.

P253 | Hybrid closed loop systems (HCLS) as an option for managing blood glucose levels in adults living with type 1 diabetes who are pregnant or planning pregnancy: A scoping review

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Aims: The aim of the study was to use a scoping review to summarise the literature on available research and evidence to date reporting on the use of HCLS in adults with type 1 diabetes who are pregnant or planning pregnancy. To then describe whether the evidence supports the use of HCLS for managing blood glucose levels in this group and the recommendations made in the National Institute for Health and Care Excellence (NICE) technology appraisal (2023- GID-TA10845).

Methods: A scoping review was conducted following rigorous and transparent methods set by an appropriate convention. A search was undertaken on the 10th of July 2023 across 3 databases and multiple grey-literature sources. Search terms used were 'adults with type 1 diabetes' (participants), 'any HCLS' (concept) and 'pregnant or planning pregnancy' (context).

Results: One hundred fifty-two individual articles were found using a search strategy; 96 of these were reviewed in full text form following screening. 26 articles met full inclusion criteria, some containing mixed methods research, leaving a total of 31 pieces of evidence to be reviewed.

Conclusions: A small amount of high-quality evidence demonstrated attainment of key pregnancy continuous glucose metric targets, which supports the use of HCLS being considered as an option to manage blood glucose levels in pregnant adults with type 1 diabetes and the NICE technology appraisal. High-quality evidence is currently lacking as to the effect of HCLS on glycated haemoglobin at the end of pregnancy. No evidence was found which specifically focused on the use of HCLS in those planning pregnancy.

P254 | Commencement of hybrid closed loop (HCL) therapy achieves improved glycaemic and symptom management in individuals with type 1 diabetes and autonomic gastrointestinal ('GI') disease

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Refer to Oral number A63.

P255 | Omnipod 5: An audit of the first 3 months of real-world data in an adult insulin pump service

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Aims: Omnipod 5 launched in the UK on 21st June 2023. It is the first patch insulin pump to deliver insulin in a hybrid closed loop. In our pump service, we have 26 patients who have been on Omnipod 5 in a hybrid closed loop with Dexcom G6 for 3 months. This abstract shows our results and experiences from the first 26 patients to use this new and exciting technology.

Method: All patients who had funding for Omnipod insulin pump (Dash or Eros) who qualified for an Omnipod promise upgrade were started on an Omnipod 5 in July/August 2023. All patients have been requested to have an HbA1c blood test before the Omnipod 5 start and at 3

months post-Omnipod 5 start. Data have also been used from Glooko, as this data set is complete.

Results: In the first 3 months of Omnipod 5 use in an insulin pump user population, glycaemic control has improved on average by 7.4 mmol mol^{-1}. Hypoglycaemic events have reduced to less than 1% or time in range. All patients switched to Omnipod 5 have the same or more time in target range (3.9–10 mmol mol^{-1}), with the best change in time in target range a 46% increase (28% to 74% time in target). 25 of 26 patients have less time in the hypoglycaemia range, with average time in hypoglycaemic range now less than 1% (1.95% reduced to 0.96%).

Summary: Omnipod 5 shows improvement in HbA1c and hypoglycaemia. Patients report sleeping better, worrying less and wanting to improve their glycaemic control further.

Acknowledgement: Good Hope Adult Insulin Pump Service.

P256 | Review of hybrid closed loop (HCL) in a tertiary diabetes service

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Aim: We are a large tertiary service with >200 patients on HCL. Aim to assess glycaemic control in this cohort to see whether we are consistent with clinical trial data.

Methods: Retrospective study using Diamond database looking at new starters on HCL over a 12-month period (2022) to look at HbA1C change, weight, structured education. Needed a minimum 6 months on HCL to be included.

Results: 133 patients total. 75% female. 75% of patients showed an improved HbA1C. Mean reduction in Hba1C was 10 mmol/mol. 30% of all patients showed a reduction in HbA1C by 20%–47%. 59% of patients had documented structured education. If attended structured education-patients more likely to show improvement in HbA1C. Weight documentation very poor as only 25% of patients were documented. Where weight was documented – 67% of patients gained weight. 60% of patients showed a weight gain if 5% body weight in 6–12 months.

Conclusion: Our study showed that HCL showed a mean reduction of 10 mmol/mol in our patients. These findings mirror those in existing randomised control trials and support the widespread use of HCL as per the current NICE TA. Documentation of weight and structured education was poor however those that had previous structured education were more likely to show improvement in HbA1C. Further more detailed analysis of our cohort will be ongoing.

P257 | Use of flash glucose monitoring (FGM) in people with type 2 diabetes prescribed multiple daily injections (MDI) of insulin: A service evaluation

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Introduction: Type 2 diabetes is a major health problem for the people of Scotland. FGM is now available on the NHS for people who meet the Scottish Health and Technologies Group (SHTG) criteria. A literature review identified limited data on long-term use of FGM in people with type 2 diabetes. The aim was to assess the impact of FGM in NHS Tayside, including effects on glycaemic control and episodes of hypoglycaemia.

Methods: A retrospective outcome-focused quantitative review was completed. Data was taken from the Scottish diabetes database, SCI-Diabetes and used to determine demographics of service users, baseline and follow-up HbA1c levels at pre-specified time intervals and prevalence of severe hypoglycaemia pre- and post-FGM use.

Results: Three hundred forty-three service users were identified following exclusions (pregnancy, insulin use <2 years). Mean age was 58.9 (range 27–91) years. Mean starting HbA1c was 82 mmol/mol (9.7%), (range 33–159 mmol/mol). There was sustained significant reduction in HbA1c in each specified time interval up to 37–48 months, including 13.8 mmol/mol (1.2%) at 1–3 months and 11.6 mmol/mol (1.1%) at 19–24 months. People with starting HbA1c >90 mmol/mol (10.4%) and those aged under 65 years had significant reductions in HbA1c, whereas there was no reduction in HbA1c in those with starting HbA1c ≤58 mmol/mol (7.5%). There was an 88.2% reduction in prevalence of severe hypoglycaemia.

Discussion: The data were heterogeneous, and significant limitations were noted. Findings were comparable to those in published literature. The reductions in HbA1c and prevalence of severe hypoglycaemia support the ongoing use of FGM in type 2 diabetes.

Clinical care and other categories posters: Other

P258 | Glycaemic control in people with diabetes attending a multidisciplinary foot clinic (MDFC)

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Aims: Improving glycaemic control is associated with reduced risk of foot ulceration in people with diabetes. We evaluated the glycaemic control in patients attending a MDFC.

Methods: This was an observational study of new patients reviewed in the MDFC (diabetologist, podiatrist, vascular and orthopaedic surgeon, orthotist). Data collected included age, sex, body mass index (BMI), type of diabetes, microvascular and macrovascular complications and HbA1c. Information about the team managing the patient's glycaemic control and interventions received in the MDFC were also gathered.

Results: Mean (SD) age and BMI (kg/m^2) of the cohort ($n = 56$; 61.8% males) was 70.4 (12.1) years and 31.1 (6.7) respectively. Most patients (92.7%) had type 2 diabetes and the most prevalent complications were hypertension (80.0%), nephropathy (74.5%) and hyperlipidaemia (63.6%). The commonest reason for review in the MDFC was foot ulceration (78.2%). 44.6% patients {HbA1c 71.1 (26.1) mmol/mol} were managed by secondary diabetes team and 55.3% {HbA1c 74.8 (22.5) mmol/mol} were managed in primary care. HbA1c, 3 months prior to review in MDFC was good (<59 mmol/mol) in 26.8%, sub-optimal (60–81 mmol/mol) in 41.5% and poor (>82 mmol/mol) in 31.7%. In the MDFC, 52.7% patients had their glycaemic control reviewed and 14.5% had their diabetes medication modified.

Conclusions: Our data highlight the opportunity for secondary care teams to improve glycaemic control of patients attending the MDFC and support primary care teams. Multidisciplinary diabetes foot teams need to consider innovative ways of addressing glycaemic control among their outpatients.

P259 | Isle of Wight (IOW) diabetes project: Early Onset Type 2 Diabetes (EOT2D) in community: Metabolic profile and treatment choices

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Aim: EOT2D has a rising prevalence and evidence indicates the need for early optimisation. In a collaboration between primary and secondary care, we set out to identify all people with EOT2D registered in primary care. Here we present data from first three practices; July–August 2023.

Methods: Practice data were searched for people with type 2 diabetes (PWT2D) aged <40. Tabletop review by the consultant diabetologist together with practice nurse and/or GP reviewing presentation, complications, biochemical and demographic data of each patient.

Option for treatment optimisation were suggested.

Results: In 2745 PWT2D registered in three practices; 81 (2.9%) were EOT2D of them two did not have diabetes (mis-coded). In remaining 79 (42 female); *Demographic and Biochemistry*: Average age and diabetes duration were 35 and 3.5 years, respectively, BMI 38 kg/m^2 (male 35.7 and female 40.7), HbA1c (mmol/mol) was 60 (male 58.3, female 61.7). 28 (15 male, 13 female) had HbA1c <49, 6 (2 male, 4 female) had HbA1c >100. Learning difficulty (LD) or mental health (MH) disorders were recorded in 18%. *Treatment (% of population)*: Metformin (66), Gliclazide (9), GLP-1 (13), Insulin (25), DPP4i (5), SGLT2i (8), Bariatric surgery (5), no treatment (15). HbA1c (mmol/mol) in12 people with no medication were; <49 in 8, and 50, 58, 75 and 100 in other 4.

Conclusion: Overall profile was worrying; poorly controlled diabetes and high BMI. Only 35% had an optimal glycaemic management, worse in in women. Tailored approach and increased follow ups are needed for EOT2D especially those with LD/MH indicating a need for innovative approaches in an already stretched service.

Acknowledgement: Isle of Wight primary/secondary care diabetes group.

P260 DUK | Genetic risk scores aid diabetes classification and prediction of insulin requirement in adult-onset diabetes

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Refer to Oral number A6.

P261 YPS | Isle of Wight (IOW) diabetes project: Early Onset Type 2 Diabetes (EOT2D) in community: A clinical review of classification

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Aim: EOT2D has a rising prevalence and evidence indicates the need for correct classification. In a collaboration between primary and secondary care, we set out to identify all people with EOT2D registered in primary care. Here we present data from first three Practices; July–August 2023.
Methods: Practice data were searched for people with type 2 diabetes (PWT2D) aged <40. Tabletop review by the consultant diabetologist together with practice nurse and/or GP reviewing presentation, complications, biochemical and demographic data.
Indicators to confirm classification were symptoms and HbA1c at presentation, family history and time to insulin therapy. These patients were sent a letter and blood form from the consultant for classification (GAD, IA2, Zinc transporter 8 or serum c-peptide test + random glucose). Choice of antibody or c-peptide was based on duration of diabetes.
Results: In 2745 PWT2D registered in three practices; 81 (2.9%) were EOT2D.
In total, 20 out of 81 (25%) needed classification review; two did not have diabetes (were prediabetes and miscoded). 18 were invited for test, 7 (33%) have not done the test, 2 were re-classified to type 1 diabetes, 7 confirmed to have type 2 diabetes and two have been identified for monogenic diabetes testing.
Conclusion: In a population of young adults registered with type 2 diabetes. At least 5% needed a change of diagnosis from type 2 diabetes: two did not have diabetes and two had type 1 diabetes with another two (2.5%) for genetic testing. In assessment of all people with diabetes, especially younger patients; it is important to confirm the diagnosis and classification.
Acknowledgement: Isle of Wight primary/secondary care diabetes group.

P262 | Perceptions and concerns of people living with diabetes (PLD) and NHS staff around the potential implementation of AI-assisted screening for diabetic eye disease: Quantitative and qualitative results from two surveys distributed in a secondary care screening settings

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Background: The English Diabetic Eye Screening Programme (DESP) generates >12million retinal images annually, which require human grading for diabetic retinopathy (DR). Research has demonstrated that Artificial Intelligence (AI)-systems can identify images with DR as well as human graders, potentially reducing workload and improving efficiency. It is important to understand the perceptions of PLD and healthcare practitioners (HCP) to help aid the implementation process, if this technology were to be introduced within the English NHS DESP.
Aims: The aim of the study was to examine perceptions of AI-assisted eye screening, using two online co-designed surveys with PLD and HCP.
Methods: Validated surveys were distributed from 1st September 2023 by four DESP centres, patient groups, charities and the British Association of Retinal Screeners. Each survey consisted of Likert-scale questions with resulting quantitative data, including free-texts for optional comments for qualitative feedback.
Results: Survey data collection is ongoing, with preliminary results exported in October 2023. 1205 PLD and 215 HCP responded to their surveys, with 24% and 37% providing respective qualitative feedback. Quantitative results will be analysed using descriptive statistics. Difference

in Likert scores for key themes will be examined by population subgroups, including age, ethnicity, sex and Townsend scores using regression analysis. Qualitative feedback will be approached thematically using a coding framework and iteratively to describe common overarching themes.

Conclusions: Quantitative survey responses with qualitative analysis will enable a deeper exploration into issues raised to inform outreach activities to support future AI implementation within the DESP.

Acknowledgement: On behalf of the AI/Automated Retinal Image Analysis System (ARIAS) Research Group.

P263 | Abstract withdrawn.

P264 | **Suicidal ideation and suicidal behaviour in people with schizophrenia taking liraglutide 3 mg daily for the management of overweight and obesity in a pilot study, using measures of depression, affect, anhedonia and total symptoms burden as predictors**

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Refer to Oral number A9.

P265 | **Manchester intermittent diet in gestational diabetes acceptability study (MIDDAS-GDM): A two-arm randomised feasibility trial of an intermittent low-energy diet (ILED) vs best National Health Service (NHS) care in women with gestational diabetes and obesity in Greater Manchester**

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Aim: First line National Institute for Health and Care Excellence (NICE) healthy diet and physical activity advice is only partially effective for managing gestational diabetes, with up to 30% requiring hypoglycaemic medication. Our patient and public involvement and engagement group informed us that the current recommendations are confusing and vague. This study aims to test the safety, feasibility, and acceptability of an intermittent low energy diet in gestational diabetes to inform a future large-scale randomised controlled trial.

Methods: The study aims to recruit 48 participants with gestational diabetes with a body mass index (BMI) ≥27.5 kg/m^2, or ≥25 kg/m^2 in high-risk minority ethnic groups (i.e. South Asian, Black African, African Caribbean), on first-line management, between November 2022 and December 2023. The control group will follow best NHS care (healthy diet and physical activity recommendations) and the intervention group will follow an ILED of two non-consecutive days per week of 1000 calories, and 5 days per week of the best NHS care recommendations. There will be an embedded qualitative sub-study for participants and healthcare professionals. Uptake, recruitment and retention rates, adherence to the dietary interventions and maternal and neonatal safety outcomes will be measured.

Results: Recruitment is ongoing; 23 participants have been recruited to date representing an uptake of 33%.

Summary: This is the first study to look at intermittent diets in women with gestational diabetes and adds to the limited literature of safety of low-calorie diets among women with gestational diabetes. This presentation will present uptake and retention figures and the rationale for the study.

Acknowledgements: additional authors - Benjamin Evans Division of Clinical Trials, Manchester Foundation Trust, UK James Yates Division of Clinical Trials,

Manchester Foundation Trust, UK Sarah Mackie Division of Clinical Trials, Manchester Foundation Trust, UK Emma Barrett Wythenshawe Hospital, Manchester Foundation Trust, UK Jessy Athirampuzha, Division of Clinical Trials, Manchester Foundation Trust, UK.

P266 DUK | Age at diagnosis, body mass index (BMI), glycaemia and unintentional weight loss are the most helpful routine clinical features for identifying type 1 diabetes in adults

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Aims: Many clinical features have been proposed to aid diabetes classification. However, only age and BMI at diagnosis have robust evidence to support their use. We aimed to assess which clinical features can be used to differentiate type 1 diabetes and type 2 diabetes at presentation.
Methods: We assessed the performance of clinical features at diagnosis differentiating type 1 diabetes and type 2 diabetes in participants from the StartRight study ($n = 746$, onset-age 18–50) and (separately) StartRight Prime study ($n = 402$, onset age >50, recruitment enriched for type 1 diabetes). Subtype was defined by c-peptide measured >3 years post-diagnosis defined (type 1 diabetes <600 pmol/L, type 2 diabetes ≥600 pmol/L).
Results: In those diagnosed age 18–50, only unintentional weight loss, DKA, osmotic symptoms, HDL, presentation HbA1c and glucose, and parental history of non-insulin treated diabetes were associated with subtype independently of diagnosis age and BMI (all $p < 0.05$). In isolation, after age at diagnosis and BMI (AUC ROC 0.69 and 0.75 respectively), HbA1c and weight loss had the strongest discriminative performance (AUC ROC 0.8 and 0.79). Osmotic symptoms and DKA showed only weak discrimination (AUC ROC 0.78 and 0.78 respectively). Where both presentation HbA1c and glucose were available ($n = 447$), discrimination was similar (AUC ROC 0.82 for both). Findings were similar in those aged >50 years at diagnosis.
Conclusion: Age of onset, BMI, presentation glycaemia and weight loss are the most helpful routine features to differentiate type 1 diabetes and type 2 diabetes. However, individual features are moderately discriminative, reinforcing the need for approaches that combine features to support robust diagnosis.

Clinical care and other categories posters: Pregnancy

P267 | Glucokinase-maturity onset diabetes of the young (GCK-MODY) in women diagnosed with gestational diabetes (GDM): Performance of national screening criteria

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Background/Aims: There is an estimated 1% prevalence of GCK-MODY among those diagnosed with GDM such that hyperglycaemia identified in pregnancy is a window of opportunity for screening. Diagnosing GCK-MODY avoids over-treatment during pregnancy and in the long term and allows cascade family genetic testing. NHS criteria now exist for GCK-MODY testing during pregnancy using fasting glucose (>5.5 mmol/L), BMI (<30 kg/m^2) and ethnicity (BMI <27 kg/m^2 if non-White).
Methods: We prospectively collected data on all women with GDM in three antenatal clinics (October 2022–September 2023 at Guy's and St Thomas' and University Hospitals Sussex; October 2022–March 2023 at Oxford University Hospitals). Those that met the national screening criteria for GCK-MODY were offered genetic testing.
Results: Eight hundred twenty women were diagnosed with GDM. 6.2% met the testing criteria for GCK-MODY ($n = 50$). Of these, 37 underwent testing (six results pending) whereas 13 declined. Two women tested positive, one had a mutation of uncertain significance. Current prevalence in this cohort is 0.4%; we would need all six pending results to be positive to reach the expected prevalence of 1%.
Conclusion: Thus far, we have found fewer cases of GCK-MODY in a multi-ethnic, multi-regional population than would be expected. Testing strictly in line with national criteria may lead to over-testing, with unnecessary use of clinical time and funds. More studies are needed to understand the performance of the screening criteria in mixed populations.

P268 | Medication prescribing for women with type 2 diabetes of reproductive age within primary care: A cross-sectional investigation for the prepared study

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Refer to Oral number A23.

P269 | Is reactive hypoglycaemia (RH) on the oral glucose tolerance test (OGTT) in pregnancy associated with adverse perinatal outcomes?

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Aim: The aim of the study was to evaluate maternal and neonatal outcomes of pregnancies with RH during OGTT, at a district general hospital with >4500 deliveries/year.
Methods: We retrospectively evaluated records of pregnant women with RH during OGTT, between August 2022 and September 2023, and matched controls by body mass index and age, with normal OGTT. We compared maternal characteristics, maternal and neonatal outcomes, using Chi-squared and Fisher's exact tests.
Results: Thirty-seven cases were matched to 25 controls. The mean baseline fasting blood glucose at OGTT in cases was 4.3 mmol/L (SD 0.3 mmol/L) and 3.0 mmol/L (SD 0.4 mmol/L) 2h post, vs 4.4 mmol/L (SD 0.4 mmol/L), and 5.5 mmol/L (SD 0.9 mmol/L) respectively in controls. Two cases (5%) but no controls were subsequently diagnosed with gestational diabetes.
Among cases, 24% had spontaneous onset of labour (SOL) (controls: 72%) (OR 0.13, 95% CI 0.03–0.45, $p < 0.001$); 24% induction of labour (IOL) (controls: 12%); 19% elective caesarean sections (controls: 8%). 41% had spontaneous vaginal delivery (controls: 56%); 24% underwent emergency caesarean section (controls: 24%). Postpartum haemorrhage >1L occurred in 30% of cases (controls: 16%). 16% of cases' neonates needed intensive care admission (controls: 12%). These differences did not reach statistical significance due to low numbers. Mean birth weight was similar (cases: 3429g (SD 436g), controls: 3461g (SD 607g)).
Conclusions: We observed lower rates of SOL in pregnancies with RH. Despite not reaching statistical significance, more complicated deliveries including IOL, caesarean sections and postpartum haemorrhage were noted. Larger studies are needed to confirm our findings and inform possible practice changes.

P270 | In gestational diabetes (GDM), basal insulin requirements vary significantly and are not well predicted by patient's weight

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Background: Insulin is frequently needed in GDM; however, there is limited evidence to support initial dosing and subsequent dose titration. We performed a retrospective cohort analysis to identify the insulin dose requirements needed to reach target fasting glucose (<5.3 mmol/L).
Methods: Women with GDM at our centre with elevated fasting glucose (>5.3 mmol/L) were initiated on 14 units of basal insulin, and taught to increase their dose by 4 units daily, following every fasting glucose >4.9 mmol/L. We utilised this rapid-titration protocol to identify the insulin dose required to achieve consistent fasting glucose control (first of 3 days <5.3 mmol/L). We used linear regression to explore associations between patient characteristics and insulin dose requirements.
Results: In those started on basal insulin ($n = 41$) the dose required to achieve control ranged from 14 to 70 units. 57% were controlled at the initial 14 units dose without experiencing hypoglycaemia. 12% required >30 units. Higher 2 h glucose on diagnosis oral glucose tolerance test (OGTT) was associated with greater basal insulin requirement (0.37 units more per mmol/L increase in 2 h glucose level [95% CI 0.19;3.45] $p = 0.030$). Fasting OGTT glucose, pre-pregnancy weight and gestation at insulin initiated were not significantly associated with the dose required.
Conclusions: In GDM, basal insulin dose requirements vary greatly and are not well predicted by patient

characteristics, including weight. A fixed starting dose with rapid titration may be the most appropriate approach to achieving the correct treatment dose.

P271 | Assessment of preconceptional care for women living with type 1 and type 2 diabetes in Sheffield: A retrospective audit (2021 to 2022)

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Aims and Objectives: The aims of the study were to evaluate the adherence of NICE recommendation for preconception care, assess the performance of renal and retinal screening within 12 months prior to pregnancy, examine the cessation of teratogenic medication before pregnancy and determine the prescription of 5 mg of folic acid before conception.
Methodology: this retrospective audit focussed on patients with type 1 and type 2 diabetes and data was collected for 50 patients during the period from 2021 to 2022 who attended the antenatal clinic in Sheffield.
Results: A notable gap in adherence to NICE recommendations was noted as only 53% of the patients living with diabetes were offered the periconceptional advice. A significant proportion of those living with diabetes belonged to the White British and Asian populations. Multigravida constituted 79% of the patient cohort, with a majority being over 30 years old.
89% of the patients living with type 1 diabetes, predominantly followed in secondary care. Notably, primary care offered pre-conceptional advice to only 22% of patients. Hb1AC targets below 48 mmol were met by 61.20% in primary care and 63.06% in secondary care. 57% and 82% of patients were offered retinal and renal assessments within 12 months prior to pregnancy varied. Prescription of the recommended 5 mg of folic acid before conception was suboptimal, with only 51% of patients receiving the appropriate dosage.
Conclusion: This audit underscores the urgent need to improve the preconception care, align with NICE guidelines and address the disparities in care between the type 1 and type 2 diabetes patients.

P272 | Exploring the use of both licensed and unlicensed hybrid closed loop (HCL) technology and continuity of care during pregnancy in people with type 1 diabetes, via the diabetes technology midwife role at University Hospitals of Leicester, Leicester, UK

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Refer to Oral number A60.

P273 | The lived experience of gestational diabetes in Ireland: Learnings from a cross-sectional national survey

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Aim: Gestational diabetes (GDM) is known to increase risk of short-and long-term complications for both mother and infant. Antenatal and postpartum education and support are integral components of GDM care. This survey aimed to capture experiences and views of women/people with previous GDM in Ireland.
Methods: Women/people with current or previous GDM were invited to complete an online 23-item cross sectional survey (April–June 2022). Social media, local media, and personal networks were used for recruitment. Data analysis was performed using SPSS statistical software and NVivo was used to assist data coding.
Results: Of the 231 participants, most were aged 35–39 (42%). 70% had experienced one GDM pregnancy. Only 6% correctly identified their increased level of risk for developing type 2 diabetes. 18.5% felt the impact of GDM on mental health was acknowledged at appointments. 44.5% of participants reported sufficient time with their healthcare professional to ask questions about GDM and have them fully answered. 68% felt support with losing weight would be helpful after pregnancy with GDM. 66%

of participants wished to receive healthy lifestyle information after pregnancy with GDM, with preference shown for topics addressing prevention of diabetes and heart disease (82%), healthy eating for healthy weight (81%) and being active (75%) and eating well with a young family (69%).

Conclusions: Findings from this survey demonstrate participants' information and support needs during and after pregnancy with GDM. Future health promotion interventions addressing chronic disease prevention should be tailored to the life stage needs of postpartum women/people with prior GDM.

Clinical care and other categories posters: Psychological health

P274 DUK PD | Results from a feasibility randomised controlled trial of a psychoeducational intervention for parents to prevent disordered eating in children and young people (CYP) with type 1 diabetes: The priority trial

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Background: CYP with type 1 diabetes are at increased risk of disordered eating. This study aimed to determine the feasibility and acceptability of a novel psychoeducational intervention for parents to prevent disordered eating in CYP with type 1 diabetes.

Methods: Parents of a CYP aged 11 to 14 years with type 1 diabetes were randomly allocated to the intervention or wait-list control group. Quantitative measures including the candidate primary outcome Diabetes Eating Problem Survey-Revised (DEPS-R), and candidate secondary outcomes Problem Areas in Diabetes Parent Revised (PAID-PR), Child Eating Behaviour Questionnaire (CEBQ), Warwick Edinburgh Mental Wellbeing Scale (WEMWBS), in addition to clinical outcomes (e.g. HbA1c, BMI, medication and healthcare utilisation) and process variables related to the Information Motivation Behaviour Skills (IMBS) Model, were collected at baseline, 1- and 3-month assessments. Feedback was collected from intervention participants via questionnaire.

Results: Eighty-nine parents were recruited, which exceeded recruitment targets, with high intervention engagement and acceptability (<80% across domains). A signal of efficacy was observed across outcome measures with moderate improvements in satiety responsiveness ($d = 0.55$, 95% CI 0.01, 1.08) and child's BMI ($d = -0.56$, 95% CI −1.09, 0.00) at 3 months being the most encouraging. Trends in the anticipated direction were observed for the DEPS-R (parent and CYP-reported), PAID-PR, WEMWBS.

Conclusions: This is the first study to have co-designed and evaluated a novel parenting intervention to prevent disordered eating in CYP with type 1 diabetes. The intervention proved feasible and acceptable with encouraging effects. Preparatory work is required prior to definitive trial to ensure the most relevant primary outcome measure and ensure strategies for optimum and robust outcome completion.

Acknowledgements: Dr Debbie Cooke – School of Health Sciences, University of Surrey, Guildford, UK.

P275 | Cognitive behavioural therapy (CBT) in the management of people with diabetes and eating disorders: A systematic review

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Background: About 30% of people with type 1 diabetes have an eating disorder. Eating disorders are twice as common in people with type 1 diabetes than people without this condition. In people with type 2 diabetes and disordered eating, 60% have binge-eating disorder. Addressing the additional management needs of people with diabetes due to associated disordered eating is crucial in establishing the overall wellbeing.

Aims: The aim of the study was to identify the effectiveness of CBT in the management of people with diabetes and eating disorder.

Methods: Six databases were searched to identify the studies utilising CBT for management of people with diabetes and associated disordered eating. All the included studies expressed the effectiveness of CBT in terms of at least one of: short- or medium-term glycaemic control, anxiety/depression or symptoms of disordered eating.

Results: A total of 406 papers were identified. The studies meeting the inclusion criteria were thoroughly read and results were collaborated. CBT was found to be an

effective intervention for people with diabetes and eating disorders. However, no statistically significant improvement was observed in treatment group when compared to control group.

Conclusion: CBT showed limited usefulness in the management of people with diabetes associated with eating disorders. The evidence suggests that family-based therapies are more useful in Children and Young People (CYP) with eating disorders whereas, enhanced CBT is more effective in adults with eating disorders. Developing an intensive intervention for management of both CYP and adults with diabetes and disordered eating is required to obtain positive results.

P276 PSY | Diabetes-associated distress in adolescents and young adults (AYA) with type 2 diabetes

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Introduction: Diabetes-associated distress is common in adults with type 2 diabetes, with a reported prevalence of 36%. While rates of youth-onset type 2 diabetes are increasing, much less is known about the psychosocial impact in AYA. We believe this to be the first report on diabetes-associated distress in AYA with type 2 diabetes from the UK.

Objective: The objective of the study was to assess the prevalence of diabetes-associated distress and associated factors in AYA with type 2 diabetes aged 17–25 years old in secondary care.

Methods: A cross-sectional analysis of routinely collected clinic visit data, including abbreviated diabetes distress score (DDS-2) and demographics. Univariate logistic regression was undertaken to identify factors associated with high distress.

Results: Eighty young people were included (female 51%, age 21.8 ± 2.2 years, BMI 32.1 ± 7.3 kg/m^2, HbA1c 74.4 ± 26.8 mmol/mol). The majority were of non-White ethnicity (71% south Asian, 18% Black) with 95% from the most deprived and second-most deprived socio-economic quintiles as per index of multiple deprivation (IMD). Reported diabetes-associated distress was high (with 56% reporting significant distress of ≥3). DDS-2 tended to be higher in females, although not reaching significance (M 2.9 ± 1.0 vs F 3.7 ± 1.7, $p = 0.09$). Neither age, BMI, HbA1c, ethnicity nor IMD were predictors of DDS-2 in this cohort.

Conclusions: Adolescents and young adults with type 2 diabetes exhibit high diabetes-associated distress, in excess of that reported in older adults. A better understanding of the predictors of diabetes-associated distress in young people would assist in the design of intervention tools for this high-risk population.

Acknowledgement: Barts Young Adult Diabetes Team.

P277 PSY | Turning the type 1 disordered eating (T1DE): Recovery factors in T1DE

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Aims: T1DE is an acronym used to describe eating disorder behaviours in individuals living with type 1 diabetes. Despite significant recent interest in this area, little is known about what 'recovery' looks like in the T1DE population. This study aimed to develop a recovery model for individuals living with T1DE.

Method: Thirteen people who self-identified as being 'in recovery' from T1DE met the study criteria and participated in semi-structured interviews. Interviews were analysed using constructivist grounded theory.

Results: A theory of recovery was developed by data grounded in the narratives of people with lived experience. Five major categories were constructed and linked to the process of recovery. These are presented as the 5Rs of recovery: (1) readiness to change, (2) roadblocks, (3) recovery factors, (4) risk factors and (5) relapse. Underpinning each category is a combination of biological, psychological, social and systemic factors.

Conclusion: Our findings propose a theory on the process of recovery and present common recovery factors. The presented model of recovery could be used as a formulation and treatment planning tool to help individuals living with T1DE and their teams. Those working with this population may want to consider how their services can facilitate any of the listed recovery factors as well as limit the barriers mentioned.

P278 PSY | Introducing the Type 1 Diabetes Distress Scale (T1DDS) before diabetes clinic appointments in an acute hospital: Initial findings

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Objectives: National guidelines recommend that healthcare professionals have appropriate skills to identify and manage non-severe mental health difficulties in people with diabetes. Diabetes distress is a common difficulty when living with diabetes. We have implemented a pre-clinic assessment tool with the aim of helping the multidisciplinary team to screen for diabetes distress, understand its prevalence in this cohort, and create a more person-centred approach to clinic appointments.
Methods: The T1DDS was sent to every person attending a type 1 diabetes consultant appointment at the centre for diabetes and endocrinology at an acute NHS hospital. After 4 months, we evaluated the levels of diabetes distress within this population and compared them to HbA1c and clinic attendance outcomes.
Results: One hundred ninety-eight people with type 1 diabetes completed the T1DDS. The median overall distress score was in the moderate range (2.07 (1.61–2.78)). HbA1c and overall distress scores showed a moderate positive correlation, $r(191) = 0.35$, $p < 0.001$. HbA1c, and the management distress subscale also showed a moderate positive correlation, $r(191) = 0.45$, $p < 0.001$. Respondents in the high distress category cancelled or did not attend (DNA) 25.0% of appointments compared to 10.9% for low, and 12.9% for moderate distress.
Summary: The T1DDS is a useful screening tool for diabetes distress prior to clinic appointments. People experiencing management-related distress are more likely to have a raised HbA1c and could benefit from additional diabetes multidisciplinary team support. A focus on improving diabetes distress could result in a decrease in cancellations and DNAs.

P279 | Real-time continuous glucose monitoring (rtCGM) in high-risk young adults with insulin-treated diabetes: Qualitative and glycaemic outcomes

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Aims: rtCGM is now standard care for people with type 1 diabetes. We explored the impact of rtCGM on psychosocial outcomes in young adults with uncontrolled hyperglycaemia who thus far have not been studied extensively in clinical trials.
Methods: In this pilot study, young adults 18–25 years (HbA1c >75 mmol/mol (9.0%)), naïve to rtCGM, were provided with rtCGM for 6 months. Semi-structured interviews (centred on barriers to self-management and experience of rtCGM use) were conducted within 2 weeks of recruitment and at the end. A thematic analysis of interviews was undertaken with analysis of psychosocial questionnaires and rtCGM metrics.
Results: Eight participants (median age (IQR) 23.0 (22.0–24.5) years, 100% non-White ethnicity) were recruited with median HbA1c 94 (88–107) mmol/mol. All participants used multiple daily insulin injections. High levels of disease burden were reported, with rtCGM-related themes identified: (1) interaction with rtCGM data, (2) feelings of control and trust from using rtCGM and (3) frustration of technology and alarms. Although participants reported that knowledge of glucose levels on their smartphone was convenient and led to 'greater control', this was countered by alarm-fatigue, technical difficulties and feeling overwhelmed. Three participants prematurely stopped using rtCGM. Despite low rtCGM wear-time (32.2 (23.1–59.4)%), improvements were observed in time in range, but no change in HbA1c.
Conclusions: Young adults with high-risk uncontrolled hyperglycaemia have complex relationships with rtCGM. rtCGM may have benefits in this high-risk group but must be determined on a case-by-case basis as associated effort may contribute to feelings of distress and/or burnout.

P280 PSY | Exploring anti-racist, meaningful and efficient ways to meet the psychological needs of people living with type 2 diabetes using group interventions: Findings from two groups developed and run by psychological practitioners working in a diabetes psychology service in East London

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Aims: There were three aims: to explore the psychological needs of people living with type 2 diabetes accessing care at the Diabetes Psychology and Psychiatry Service (DPPS); to develop meaningful and anti-racist group psychological interventions in response to these needs; and to explore resource-efficient ways to meet the growing demands on the DPPS.
Methods: The DPPS delivered two groups: a four-week pilot intervention (in person) and a six-week online intervention for people living with type 2 diabetes. The groups were tailored to the needs of each group and incorporated psychological techniques from different approaches. Sessions also involved co-facilitation from other professionals within the multi disciplinary team and from outside agencies. Feedback on the groups was collected through verbal and written feedback.
Results: Groups are well-received but poorly-attended, creating dilemmas for resource-limited services. Some challenges are shared across client groups whilst some are specific to certain populations. Accessibility in relation to language and how groups are delivered (e.g. online or in person) is important. Individual education about diabetes is also a factor in determining the appropriateness of psychological intervention.
Conclusions: The development of effective group interventions for people living with type 2 diabetes requires further discussion between and research by psychological practitioners working in this field. Partnership with other professionals both within and outside of the NHS is also needed to address the needs of people living with diabetes in a holistic and anti-racist manner.

P281 PSY | Psychosocial support for adults with new onset type 1 diabetes: Experiences of participating in the living with and adapting to diabetes programme (ladder)

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Objectives: Psychosocial challenges following adult-onset type 1 diabetes are common but are not systematically addressed in clinical practice. This study explored the experiences of participants in an intervention co-designed with adults with new onset type 1 diabetes and healthcare professionals tailored to facilitate conversations about the psychosocial impact of diabetes following a new diagnosis.
Methods: The intervention integrated visual dialogue tools in two face-to-face consultations, the first held 1–5 months following the diagnosis in four diabetes specialist clinics (two in Denmark and two in the UK). Participants were interviewed after the final consultation to explore their experiences and potential benefits of the intervention. Interviews were audio-recorded, transcribed and analysed thematically.
Results: Thirty-eight adults with new-onset type 1 diabetes (50% males, median age at diagnosis 31 years, IQR 27–45) participated in the study.
Thematic analysis identified that adults with new-onset type 1 diabetes found that the intervention: (1) supported acceptance and processing of the diagnosis which increased the ability to regulate emotions (2) facilitated understanding and acknowledgement of the interdependence between bio-psycho-social aspects of diabetes which supported social interactions and behavioural adaptations and (3) helped normalise feelings and reactions related to living with type 1 diabetes which increased self-efficacy.
Conclusion: Using visual dialogue tools in consultations with adults with new-onset type 1 diabetes can support dialogue about psychosocial issues related to a new life with type 1 diabetes. Long-term benefits of the intervention on clinical and psychosocial outcomes need to be explored in a larger study.

P282 | Clinical phenotypes of type 1 diabetes and disordered eating (T1DE) developed from a case vignettes series from the steady research study and London-T1DE pilot service

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Aims: Developing a classification system for T1DE from a series of case vignettes from a broad spectrum of severity and clinical presentations in research and clinical practice.
Methods: Anonymised vignettes were developed from the Structured Clinical Interview for Diagnostic and Statistical Manual for Mental Disorders and physical health assessment notes of participants in the STEADY trial (Safe management of people with type 1 diabetes and Disordered Eating Study; $n=43$) and from the multidisciplinary assessment notes of service users of the London-T1DE-pilot service ($n=16$) in an iterative approach including medical, mental health and psychosocial history, patterns of T1DE symptoms and medical risk. Vignettes were clustered into diagnostic phenotypes using eating disorder diagnostic frameworks with the inclusion of diabetes-specific behaviours.
Results: Three main phenotypes emerged: Diabulima-T1DE, Binge-T1DE and Restrict-T1DE. Binge-T1DE was present in 30, Diabulimia-T1DE in 14 and Restrict-T1DE in 15 of the 59 vignettes. Diabulimia-T1DE was grouped into near-total and partial insulin omission. Binge-T1DE was stratified in purging-through-vomiting ($n=21$), no compensatory behaviour ($n=2$) and compensation with exercise and/or restriction ($n=8$), hypoglycaemia related binging ($n=1$) and low frequency/transdiagnostic symptoms/cycling ($n=3$). There are ongoing considerations of whether diabulimia-T1DE (low-medical risk) is an appropriate subcategory or is more accurately a purge-T1DE. Consideration should be given to an additional 'other specified feeding or eating disorder' OSFED-type category for low frequency or cycling symptoms.
Conclusions: This is the first classification of T1DE phenotypes rooted in a structured analysis of case vignettes, which will now contribute to international discussions of consensus-finding on T1DE diagnostic criteria and categories.

Clinical care and other categories posters: Real-world study

P283 | Treating the ominous octet in type 2 diabetes with early, intensive combination therapy: Real-world evidence from an international collaborative database

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Aims: The current treatment model in type 2 diabetes fails to remedy, early on, many of the metabolic abnormalities that synergistically contribute to hyperglycaemia. The aim of this study was to compare the glycaemic and cardiorenal effects of combination therapy involving metformin, pioglitazone, sodium-glucose-linked-contransporter-2 inhibitor (SGLT2i) and glucagon like peptide-1 receptor agonist (GLP-1RA) vs a more conventional treatment approach combining sulphonylureas (SU) and insulin from point of type 2 diabetes diagnosis.
Methods: We performed a retrospective cohort study using the Global Collaborative Network in TriNetX. We included individuals prescribed metformin, pioglitazone, an SGLT2i and a GLP-1 RA for at least 1-year duration, within 3 years of a type 2 diabetes diagnosis and compared with individuals prescribed insulin and a SU within the same temporal pattern. Individuals were followed up for 3 years.
Results: A total of 1762 PSM individuals were included in the final analysis ($n=881$ per cohort). At 3 years, compared to the insulin/SU group, the metformin/pioglitazone/SGLT2i/GLP-1 RA group had a lower risk of heart failure (HR 0.34, 95% CI 0.13–0.87, $p=0.018$), acute coronary syndrome (HR 0.29, 95% CI 0.12–0.67, $p=0.002$), stroke (HR 0.17, 95% CI 0.06–0.49, $p<0.001$), chronic kidney disease (HR 0.50, 95% CI 0.25–0.99, $p=0.042$) and hospitalisation (HR 0.59, 95% CI 0.46–0.77, $p<0.001$).
Conclusions: Early, intensive polytherapy, targeting distinct pathophysiological defects, is associated with significantly better cardio-renal outcomes, compared to insulin and SU therapy.

P284 | A study into the effectiveness of flash glucose monitoring in the management of diabetes and effect on diabetes distress scores

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Objective: The objective of the study was to investigate the impact of Flash Glucose Monitoring devices on type 1 diabetes management and diabetes distress scores in a cohort of patients.
Methods: Data were collected from a cohort of 30 patients who are using the Libre view sensor in the Bridgend health board area. 30 patients were included in this project and were categorised into three groups (good, average and poor control) based on their baseline HbA1c levels with 10 patients in each category. The impact of FGM devices on Diabetes Distress Scores (DDS17) in these patients was analysed. The study also involved retrospectively investigating the effect of FGM devices on HbA1c, eGFR, LDL and triglyceride levels in the cohort of patients chosen.
Results: There was a significant change in DDS Scores in the cohort of patients with good glycaemic control (95% confidence interval, *p*-value – 0.004) and also a significant improvement in the regimen-related distress score among these patients (95 confidence interval, *p*-value – 0.019). However this significance was lost in patients with average and poor diabetic control. There was also reduction in HbA1c levels in groups 1 and 3 (average decrease-4.36 mmol/mol). Changes in eGFR, triglyceride and LDL levels in were not significant.
Conclusion: FGM devices have shown a clear impact in reducing HbA1c levels and have improved DDS scores in patients with type 1 diabetes showing that they are an important tool in improving our clinical management of type 1 diabetes. However patients with poor glycaemic control, were still in moderate diabetes distress score suggesting a need to review other aspects of management.

P285 | Setting up a (cardio-renal-metabolic) CRM implementation multidisciplinary team (MDT) clinic in the large tertiary centre: Data on safety and effective use of sodium glucose co-transporter-2 inhibitors (SGLT2-I) in complex CRM patients

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Background and Aims: Following recent trials around the impact of SGLT2-I on cardio-renal-metabolic conditions, an implementation MDT clinic was set up in Queen Elizabeth Hospital Birmingham. In this study, we are presenting our data pertaining to the effectiveness and safety of SGLT2-I in complex patients.
Methods: Retrospective study with study period of March 2021–February 2023. Patients with heart failure, and ejection fraction ≤40% with or without diabetes offered SGLT2I were included. Data were collected using hospital's electronic system.
Results: Two hundred six patients were included. The mean age was 66.4 ± 13.6 years, 29% were female, mean BMI was 30 ± 7 kg/m^2. 75 patients (36.4%) had type 2 diabetes with mean HbA1c of 57.29 ± 15.88 mmol/mol.
Over the follow-up period of 5.5 (IQR 2.1–8.2) months, 13 (6.3%) patients stopped SGLT2I, and two died. 27 (13.1%) needed review by diabetes team.
An increase in BMI of 0.2 kg/m^2 ± 6.9 and a decline of 1.7 ± 10.3 mL/min/1.73 m^2 in eGFR were noted. An increase of 0.14 ± 21 mmol/mol in HbA1c was noted in patients with type 2 diabetes.
Twenty-five patients continued follow-up in the clinic, and 18 were moved to another clinic. 148 patients were discharged to primary care. 14 patients experienced urinary infections, but no incident of diabetes ketoacidosis. 141 patients did not need hospital admission for decompensated heart failure.
Conclusions: We have shown the safe utilisation of SGLT2-I in patients with HFrEF in real-world settings. The dropout rate was 6.3%, lower than noted in the DAPA-HF trial. However, our study had a small sample size and short follow-up.

P286 | Assessing the glycaemic impact of Freestyle Libre (FSL) monitoring in patients with insulin-treated type 2 diabetes

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Objectives: The impact of FSL in type 1 diabetes is established; however, data in people with type 2 diabetes is lacking. In Wales, FSL has been available for patients with insulin-treated type 2 diabetes since July 2021. We assessed the glycaemic impact of FSL in patients with insulin-treated type 2 diabetes.
Methods: A retrospective analysis included people with type 2 diabetes on insulin (basal, mixed, basal-bolus), initiated on FSL February 2022–September 2023 at Neath Port Talbot hospital. Patients included had a sensor activity time >60%, with pre- and post-FSL HbA1c available. Baseline and recent Glucose Management Index (GMI), Time in Range (TIR), Time Above (TAR) and Below Range (TBR) were compared. Significance was determined using Wilcoxon signed ranks.
Results: Two hundred thirty-six patients were included (46 basal only, 86 pre-mixed, 104 basal-bolus). The median baseline HbA1c was 75 (IQR 62–89) mmol/mol ([9.0%] [7.9–10.3%]) which improved to 64.5 (IQR 55.3–76.0) mmol/mol ([8.1%] [7.2%–9.1%]) ($p < 0.001$). The mean follow-up period was 393 days. The mean TBR was 1.1±3.1% pre-FSL, reduced to 0.6±1.5% at follow-up ($p < 0.01$). TIR improved and TAR reduced, but was not statistically significant. The median GMI was similar at follow-up compared with baseline ([62.0 (53.5–73.0) v 61.0 (54.0–69.0)], $p = 0.20$).
Conclusion: FSL use associated with a significant HbA1c reduction, improved TBR, and trending improvements in other parameters in people with insulin-treated type 2 diabetes. Further real-world studies are needed.

P287 PC | Remission rates at 1 year for participants of the NHS type 2 diabetes path to remission (T2DR) programme

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Aims: This study assessed remission rates for participants of the English National Health Service (NHS) Type 2 diabetes path to remission (T2DR) Programme, a 12-month service offering total diet replacement alongside behavioural support.
Methods: An observational cohort study of people with type 2 diabetes starting the T2DR Programme between September 2020 and December 2021. Programme data were linked to the National Diabetes Audit to ascertain HbA1c measurements and glucose-lowering medication prescriptions. Diabetes remission at 1 year was defined as an HbA1c <48 mmol/mol recorded 11–15 months after programme start, with another HbA1c <48 mmol/mol recorded at least 3 months prior, and no glucose-lowering medications prescribed from 3 months before the earlier test.
Results: From September 2020 to July 2023, there were 12,468 referrals and 7084 participants. To allow sufficient time to finish the programme, analyses were limited to 1708 participants with complete-case data by December 2021. Of those, 708 had two eligible HbA1c measurements, of whom 250 (35%) had both HbA1c measurements <48 mmol/mol, with 190 (27%) achieving remission. Mean weight loss at 1 year for the 1708 participants was 9.4 (8.9–9.8) kg and 14.8 (13.4–16.3) kg for those achieving remission.
Of the 1708 participants, 946 completed the programme. Of those, 452 had two eligible HbA1c measurements, of whom 186 (41%) had both HbA1c measurements <48 mmol/mol, with 146 (32%) achieving remission. Mean weight loss at 1 year for completers was 10.3 (9.7–10.9) kg and 15.9 (14.3–17.4) kg for those achieving remission.

Conclusions: Findings from the NHS T2DR programme demonstrate that remission may be achieved outside of research settings, through at-scale service delivery, for many people with type 2 diabetes.

P288 | Abstract withdrawn.

P289 | A single centre experience with fast-acting aspart insulin (FIAsp) continuous subcutaneous insulin infusion at 12 months and beyond: An update

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Introduction: Due to faster absorption and onset of action, ultra-fast acting insulins such as fast-acting aspart insulin (FIAsp), may achieve greater prandial sugars control in users of continuous subcutaneous insulin infusion (CSII). It is unclear whether these potential benefits are sustained.
Methods: Ambulatory glucose profile including time in range (TIR), time below range (TBR), time above range (TAR), hyper- and hypoglycaemias and HBA1C were assessed in 23 patients who remained on FIAsp CSII for more than 12 months.
Results: Of all 23, 44% male and 56% females had a mean age 43 ± 15 years. Follow up results for 19 of all, showed a mean TIR of 66 ± 19%, (range 17%–90%). Moreover, TBR was 3.0 ± 3.70 (range 0%–15%). Improved HBA1C of 54 ± 9.90, (range 43–76 mmol/mol), and reduced basal insulin of 20 ± 14, (range 2–58 units). These results show a statistically significant change since switching to FIAsp (non-FIAsp HBA1C 60 ± 18 mmol/mol, non-FIAsp basal insulin 25 ± 18 units), $p < 0.05$. 90% ($n = 17$) of the participants had stable hypoglycaemia frequency. However, 37% ($n = 7$), reported unexplained hyperglycaemia with probable reported reasons being infusion set leakage, blockage, or skin irritation/reaction.
Conclusion: FIAsp can be successfully used as CSII with TIR, TBR and HBA1C remaining stable on continued use 12 months and beyond. However, 1/3rd of FIAsp users may experience unexplained hyperglycaemia with long term usage. Probable reasons for this include cannula site leakage, blockage or skin irritation.

Clinical care and other categories posters: Screening and prediabetes

P290 | Assessment and predication of liver fibrosis in people with prediabetes and type 2 diabetes: Preliminary findings from the identify study

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Aims: Scoring systems exist to help stratify individuals' risk of liver fibrosis. Their utility and validation in people with prediabetes and type 2 diabetes is limited. We sought to identify factors that are predictive of liver fibrosis according to fibroscan in these people.
Methods: We performed a community based enhanced screening programme in a population of individuals with prediabetes and type 2 diabetes using fibroscan. We evaluated existing non-invasive fibrosis algorithms: Fibrosis-4 (FIB-4) and NAFLD fibrosis score in predicting liver fibrosis (a liver stiffness measurement at fibroscan examination of ≥8kPa). In the subgroup of people with type 2 diabetes, multiple linear regression was used to test if: HbA1c, gamma-glutamyltransferase (GGT), triglycerides and total cholesterol (TC)/ HDL ratio significantly predicted liver stiffness measurement.
Results: Eighty-one individuals were included ($n = 35$ prediabetes, $n = 46$ type 2 diabetes). Four individuals with prediabetes and 14 individuals with type 2 diabetes had liver fibrosis on fibroscan examination. FIB-4 (Sn/Sp: 27.8%/92.1%, AUC 0.58, 95% CI 0.41–0.74, $p = 0.366$) and NAFLD fibrosis score (Sn/Sp: 94.4%/44.4%, AUC 0.66, 95% CI 0.54–0.79, $p = 0.01$) performed poorly at identifying significant liver fibrosis as assessed by fibroscan. Multiple linear regression of fibrosis score in the subgroup was statistically significant ($R^2 = 0.41$, $F(4, 42) = 7.37$, $p < 0.001$). Only GGT ($b = 0.494$ $p = 0.003$) and HbA1c ($b = 0.335$, $p = 0.009$) significantly predicted liver stiffness measurement.
Conclusions: Current fibrosis screening tools correlate poorly to liver fibrosis measured by fibroscan in people with prediabetes and type 2 diabetes. Scoring systems incorporating diabetes-specific metrics should be evaluated in epidemiological studies incorporating external validation.

P291 DUK | Screening children for paediatric diabetes (the ELSA study): Accessing underserved communities

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Refer to Oral number A28.

P292 | Parents' and stakeholders' view towards screening children for type 1 diabetes: ELSA 1 study

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Aim: Benefits of screening children for type 1 diabetes include a 5-fold reduction in diabetic ketoacidosis at onset and improved early glucose control. The ELSA 1 study aimed to explore perceived barriers and facilitators to screening for UK parents and stakeholders.

Methods: Semi-structured qualitative interviews were undertaken with 38 parents and 27 stakeholders. Purposive sampling aimed to recruit a representative sample by ethnicity and socio-economic class. Interviews were audio recorded and transcribed verbatim. We performed thematic analysis using the 'burden of screening' framework and the 'National Screening Committee's implementation criteria'.

Results: For parents, 74% were Mothers, 47% were from an ethnic minority group, 24% from a lower socioeconomic class and 30% had a family member with type 1 diabetes. 74% of stakeholders were healthcare professionals and 33% were national policymakers.

Parents (90%) were supportive of screening research but there was risk of confusion and uncertainty with screening results. Implications of a child screening positive included emotional distress and behavioural lifestyle changes. All parents sought peer support and/or psychology to alleviate the burden of screening. Parents expressed interest in immunoprevention trials or treatment, but were concerned about side effects and would involve the child in decision-making. Stakeholders thought a licensed preventative treatment was needed to justify screening for the general population. Finally, the proposed ELSA trial, adopting dried blood spot testing at home or in the community, was considered acceptable and deemed an important research area.

Conclusions: Parents thought the benefits of screening outweighed harms whereas stakeholders thought a licensed treatment was needed. Both recognised need for support systems for children identified at-risk.

Clinical care and other categories posters: Structure/systems of care and healthcare delivery

P293 NAH | Driving change with data in a type 1 diabetes service: Results from a pilot study of 697 people with type 1 diabetes

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Aims: There is an urgent need to see people with diabetes who are likely to deteriorate while awaiting an appointment. However this requires strategies to increase capacity within the setting of restricted resources. Our aim was to identify and prioritise people with type 1 diabetes with stable clinical data for patient initiated follow-up (PIFU) which could free-up capacity.

Methods: Using electronic health records we identified 697 people with type 1 diabetes attending outpatient clinics at a tertiary hospital within a 3-month period. In this cohort new-onset modifiable risk factors (RF) which were new clinical events/data that occurred after their last routine diabetes visit, were evaluated. People with no new RF

and stable glycaemic parameters were also identified and highlighted to clinicians. The RF included diabetes emergency visit/hospitalisation, HbA1c >86 mmol/mol or <48 mmol/mol, HbA1c rise or fall >20 mmol/mol, eGFR fall >15 mL/min/year and retinopathy treatment.
Results: Of the 697 people (50.5% female/24% non-Caucasian), 76 had new RF ('highest risk') who were more likely to be non-Caucasian and live in areas of greater deprivation. Similarly 154 people were identified as 'lower risk' with stable data and no RF. The remainder (467 people) had no new data since their last visit to assess risk. Our data-led approach facilitated 85 of the 697 (12.25%) people to be moved to PIFU.
Conclusion: A pragmatic data-led prioritisation method identified people with type 1 diabetes suitable for PIFU and enables those at highest need to be clinically prioritised.

P294 | Using a pragmatic health informatics approach to improve clinical care in people with diabetes and heart failure (HF)

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Aims: People with diabetes and HF are at high risk and often have fragmented clinical care. Moreover, there is a significant backlog of care in the NHS. Our aim was to identify and prioritise people with diabetes and HF who are likely to deteriorate while awaiting an appointment.
Methods: Using data from electronic healthcare records we identified 146 people with diabetes and HF in outpatient services in a tertiary hospital. In this cohort, we evaluated new onset modifiable risk factors (RF) which were new clinical events/data that occurred after their last routine diabetes or HF clinic visit. The RF included diabetes or HF related emergency visit/hospitalisation, HbA1c >86 mmol/mol or <48 mmol/mol, HbA1c rise or fall >20 mmol/mol, eGFR fall >15 mL/min/year, ophthalmological treatment for retinopathy, eGFR <30 mL/min, left ventricular ejection fraction <40% or NT-proBNP >2000 pg/mL. A diabetes and HF pharmacist led the clinical care within an existing diabetes complications clinic.
Results: Of the 146 people (53% male/40% non-Caucasian), 90 (57% male, 41% non-Caucasian) had new onset risk factors. Of the 54 highest risk people reviewed to date, 29 (54%) had an intervention predominantly relating to treatment optimisation for HF (10), diabetes (8), both (4) and strategies to reduce hypoglycaemia (7).
Conclusion: A pragmatic data-led prioritisation method identified people with diabetes and HF at highest need for clinical prioritisation and intervention. Health informatics approaches such as ours can enhance clinical care and efficiency for high-risk people with diabetes and HF.

P295 | How do older people with diabetes experience remote consultations? A qualitative phenomenological study

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Refer to Oral number A24.

P296 | Implementing a steroid grab bag to help detect steroid induced diabetes and hyperglycaemia in neuro-oncology patients

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Aims: NICE and JBDS guidance recommends monitoring for steroid induced diabetes (SID) in patients starting high dose steroids. We assessed the effect of a steroid 'grab bag' and routine HbA1c check on monitoring for steroid induced diabetes and hyperglycaemia within our neuro-oncology department.
Methods: HbA1c was added to pretreatment bloods and a steroid 'grab bag' (TEE2 BG meter with education, advice on abnormal BG results and a GP letter) made available to new neuro-oncology outpatients before initiation of high dose steroid therapy. Six months of HbA1c measurement and provision of blood glucose (BG) monitoring was audited for 6 months prior and post implementation of changes.
Results: In the 6 months before implementation, 33 new neuro-oncology outpatients (18 male, 15 female) were started on high-dose steroids. When reaudited over the same 6 months post implementation, 19 (9 male, 10

female) outpatients were started on high-dose steroids. Median daily dexamethasone dose was identical at 4 mg. HbA1c measurement prior to steroid treatment improved post implementation (30.3% vs 78.9% $p=0.001$) as did BG monitoring (40% vs 87.5% $p=0.003$). SID was detected in one patient before implementation of change and two after ($p=0.264$).

Conclusions: Implementation of the steroid 'grab bag' and addition of HbA1c to routine bloods improved monitoring of BG levels to patients that are receiving high dose steroid therapy in line with guidance. This simple change will continue to identify those at risk of developing steroid induced diabetes in this group and should be considered for implementation in all clinical areas where outpatients are regularly started on high dose steroids.

P297 | Improving glycaemic outcomes and reducing admissions in vulnerable frail people with type 2 diabetes, while concurrently optimising insulin administration by District Nursing (DN) teams

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Background: In order to combat rising demand, but limited DN capacity, we revised the insulin regimen in all patients with type 2 diabetes requiring two visits, thereby halving the number of visits per day.

Methods: Retrospective review of patient outcomes ($n=103$), following revision of insulin regimens using very long acting (VLA) background insulin alone or in combination with a Mixed insulin (VLA + Mix) or one dose of quick acting insulin (VLA + QA). Data were collected for consecutive patients from Dec 2019.

Results: The cohort consisted of 64 females: 39 males, age 80.8 ± 8.8 years, 651 ± 370 days follow-up (mean ± SD). One patient was excluded from the analysis as twice a day visits were reinstated due to severe insulin resistance. 23 have deceased, none directly as a consequence of hyperglycaemia or hypoglycaemia. HbA1c improved from 94.9 ± 19.8 ($n=102$) at baseline to 78.6 ± 13.8 at 12 months ($n=73$), 73.9 ± 12.8 at 24 months ($n=50$), and 69.3 ± 13.9 at 3 years ($n=20$), $p<0.001$. Final regimens were: VLA alone ($n=10$), VLA + Mix ($n=73$), VLA + QA ($n=2$), Mix alone ($n=4$), EOLC insulin withdrawn ($n=13$).

In the year prior to regimen change, there were four admissions for hypoglycaemia, 28 for hyperglycaemia, reducing to 2 and 7, respectively, in the year afterwards, with 5 and 7 in Year 2, and 1 and 4, respectively, in Year 3.

Conclusions: Implementation of VLA combinations not only halved DN team visits but also improved glycaemic outcomes and reduced admissions, and therefore we would recommend that this approach be adopted more widely.

Acknowledgement: On behalf of Sheffield Teaching Hospitals Community Diabetes Team.

P298 | Investigating healthcare professionals' perspectives and experiences of food insecurity (FI)-related conversations in diabetes care

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Aims: Household food insecurity is a serious public health concern and disproportionately affects people living with chronic health conditions in the UK, undermining diabetes self-management for food insecure individuals. However, little is known about healthcare professionals' experiences of supporting people affected by diabetes and FI, and no national guidelines on how to incorporate consideration of FI exists within UK diabetes care. Therefore, a qualitative study of NHS healthcare professionals' understanding of FI and the extent to which it informs their clinical practice was undertaken.

Methods: Fifteen healthcare professionals providing self-management support to people with type 1 and/or type 2 diabetes in NHS Grampian took part in semi-structured interviews. Data were analysed using a thematic framework approach informed by the COM-B behaviour change model.

Results: Although the potential impact of FI on diabetes self-management was recognised, this important consideration is not currently core to routine clinical practice. Specific enablers and barriers identified included: personal feelings about raising the issue, knowledge of available resources, the patient-practitioner relationship, and the wider socioeconomic environment. Practical suggestions to support healthcare professionals in practice included: specific training, access to patient support information, use of a screening tool to identify FI patients during routine care and building NHS-third sector links.

Conclusions: Our findings provide insight into cognitive factors, emotional processes and environmental systems impacting on healthcare professionals' practice

supporting individuals with diabetes and food insecurity. Research with patients affected is needed to gain a better understanding of how to provide support within NHS settings.

P299 | Persistent high mortality in patients presenting with new diabetes-related foot ulceration: More so in those under primary care for their diabetes follow-up

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Aim: Much emphasis is placed on preventing amputation, but not as much on 'pre-mature' mortality around diabetes foot ulceration (DFU). The aim was to assess the local care processes and mortality upon presentation to a multidisciplinary diabetic foot team (MDfT) with a DFU.
Method: A retrospective analysis of new DFU presentations to an MDfT within 2018. Data were extracted from national foot audit and local electronic patient notes. Demographic and outcomes were analysed in four main groups, depending on patients' follow-up for diabetes care as primary, secondary, community care or unknown follow-up. The primary end point was mortality at 1 and 5 years, and secondary end points were changes in metabolic control at 1 year.
Results: There were 329 new presentations, of which 203 who were local residents had clinical notes reviewed. Mean age was 69.14 ± 13.86 years, 84% had type 2 diabetes. Mean HbA1c at presentation was 77 ± 32.58 mmol/mol. The majority (66%) were under primary care for their diabetes follow-up, 18.2% secondary care, 4.9% community care and 10.8% follow-up unknown. The 1-year mortality was two-fold higher in the patients under primary care for their diabetes compared with the other three groups (2%;0%;0%;0% respectively). The 5-year mortality was similar across primary, secondary and community care (47%;51%;50% respectively).
Conclusion: The mortality remains relatively high for patients under primary care for their diabetes care, despite the notion of having fewer complex comorbidities. An optimisation of risk factors of premature mortality and care pathways in these patients is of utmost value.

P300 | Improving compliance with the National Diabetes Audit eight care processes in type 1 diabetes using clinically led near real time interactive data dashboards in the Diabetes Care For You (DCFY) community specialist service

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Aims: NICE guidance states that people with type 1 diabetes should have eight care processes completed annually. The association between care process achievement and future mortality risk illustrates the importance of this. Our service was commissioned to complete eight care processes as part of the service for people with type 1 diabetes.
Methods: An interactive clinically designed data dashboard was created to mirror the National Diabetes Audit, linking to prompts in clinical templates and pop-ups reminding colleagues of outstanding care processes. This allowed near real time data on compliance with completion of each or all of the care processes for our cohort. Use of the dashboard to exclude those with pending appointments enabled a focused quality improvement strategy for those with the least care process achievement.
Results: Prior to the implementation of the dashboard, in 2017–2018, DCFY had 56.1% of total patients with type 1 diabetes ($n = 1435$) who had completed eight care processes, compared to 42.9% England average. Post dashboard implementation, in 2021–2022, 65.4% of 1400 patients had completed all eight care processes, compared to 33.2% nationally. Urine albumin demonstrated the most significant improvement (64.5% and 84.1% in years 2017–2018 and 2021–2022 respectively).
Conclusion: Use of a dashboard to highlight incomplete care processes and subsequently complete them has demonstrated a consistent increase in care processes achievement, despite national compliance remaining below pre-pandemic levels. Use of interactive data dashboards to highlight omissions in routine care allows a concise use of resources to focus clinical activity and improve outcomes.

P301 | Establishing the link between social deprivation (SD) and poor monitoring of diabetes care processes (CP) in England: An observational study

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Background: The link between SD and adverse diabetes clinical outcomes has been previously reported. Regular monitoring of key diabetes parameters like glycaemic control, blood pressure, foot and kidney checks is a key determinant for preventing longer-term complications. However, the association between SD and regular diabetes monitoring of key CP is yet to be fully explored.
Objectives: This observational study examines the association between SD and differences in diabetes CP monitoring by mapping such outcomes within the 42 NHS Integrated Care Boards (ICBs) in England.
Methods: Using NHS Digital data, ICBs with highest and lowest rates of SD were first categorised based on highest and lowest quarter percentiles, and then, their annual measurements of all nine key CP were obtained. Choropleth mapping was used to examine differences between various ICBs outcomes. Means were compared using paired *t*-test and ANOVA.
Results: Of the nine CP's, HbA1c, blood pressure, retinal screening and urinary albumin excretion were significantly lower ($p < 0.05$) in ICBs of high SD when compared to those with low SD. Foot checks and smoking recording were unexpectedly higher in areas of low SD but not statistically significant. Overall within all ICBs, those with high SD had significantly lower recording of all nine CP's ($p = 0.006$).
Conclusions: This study highlights SD as a significant factor in influencing diabetes checks, potentially resulting in adverse diabetes outcomes. Our results underscore the need for ICBs to focus on improving regular healthcare access especially in areas with high social deprivation.

P302 | Perioperative Diabetes Service (PDS) for people living with diabetes attending elective surgeries: A preliminary outcome analysis

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Aims: The aim of the study was to assess the effectiveness of a PDS in improving glucose levels, length of stay and patient harm among people living with diabetes (PLWD) attending elective surgery.
Methods: PLWD were referred to the PDS if they were referred for elective surgery and met one of the referral criteria (HbA1c >69 mmol/mol, problematic hypoglycaemia, recent hyperglycaemic emergencies, insulin pump therapy) at pre-operative assessment. In the PDS, we optimised perioperative diabetes management in outpatient and inpatient settings. Their outcomes are compared against those meeting referral criteria but not referred to the PDS.
Results: Forty-four patients referred to the PDS underwent surgery (men 56.3%, age 63.0 years [51–75], day cases 45.5%, pre-referral HbA1c 81.0 mmol/mol [72.3–92.0], HbA1c >69 mmol/mol in 36/44). Twenty PLWD had a HbA1c repeated before surgery. The comparator group included 91 PLWD (men 57.1%, age 64.0 years [54–73], day cases 60.4%, HbA1c 75 mmol/mol [71.0–85.0]). Patients referred to PDS experienced significant HbA1c reduction (from 87.0 [75.0–94.5] to 61.0 [76.0–94.0] mmol/mol, $p < 0.001$) and higher proportion achieved HbA1c <69 mmol/mol (12/20 [60%] vs 0/91, χ^2 61.2, $p < 0.001$). There was no significant difference in length of stay (excluding day cases) (3.0 [2.0–4.8] vs 3.0 [1.0–7.8] days, $p = 0.66$), hypoglycaemia incidence (glucose <4 mmol/L) (8.6 [95% CI 4.8–14.1] vs 7.6 [95% CI 5.0–11.1]events/100 patient-days, $p = 0.71$), nor in percentage of glucose readings within target range (6–10 mmol/L) (48.3 [25.0–81.7]% vs 33.3 [0–70.2]%, $p = 0.26$).
Conclusions: PDS was effective in improving glycaemia peri-operatively, but we could not identify improvements in other metrics, likely due to small sample size. Current surgical pathway needs to be reviewed.

P303 | Reducing district nurse (DN) visits and improving outcomes in patients with diabetes: A virtual intervention

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Aims and Methods: The aims of the study were to address the sharp rise in DN visits for insulin administration and glucose testing in our area a community diabetes specialist nurse worked virtually with DNs to review their patients and advise on safe treatment de-escalation or escalation as appropriate, with monthly follow-ups as required. Over 3 months 101 of 224 patients receiving these visits were reviewed. Because of deaths and patients who moved, 6-month pre- and post-intervention data was only available in 88. Their mean age was 80 years, 87% had type 2 diabetes and 93% had moderate/severe frailty.
Results: Mean HbA1c reduced from 8.6% to 8.2%. Fewer had an HbA1c <6.5% (19.5% vs 6.0%; $p < 0.03$), and fewer an HbA1c of ≥10% (27.6% vs 12.4%; $p < 0.04$). There were fewer CBG readings <4.0 mmol/L (28 vs 1; $p < 0.001$) in the 7 days prior to the insulin change compared with the 7 days immediately after, and fewer >20 mmol/L (112 vs 17; $p < 0.001$). DN visits reduced by 35% (137 vs 89/week; $p < 0.03$), hospital admissions by 54% (112 to 52; $p < 0.0001$), admissions for hypoglycaemia/hyperglycaemia from 29 to 7 ($p < 0.001$). Estimated yearly savings through reduced admissions (~£385,000), DN visits (£1,314,000) and usage of insulin and needles (~£11,000) totalled ~£1.7 million. Greater savings are possible if extended to all 224 patients.
Conclusions: As far as we are aware, this is the first study to evaluate in detail the safety and potential cost saving of rationalising diabetes therapies in this group of patients. The reduced burden on the service, cost savings and reduced harms will be of interest other DN services.

P304 | Abstract withdrawn.

P305 PC | Protect-now digital weight management: A primary care collaborative model enhancing equitable access to the NHS Digital Weight Management Programme (DWMP) through a population health management approach

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Aim: The NHS DWMP supports people with obesity and diabetes and/or hypertension to manage their weight and improve health. Historically, referral rates across Norfolk and Waveney Integrated Care System (NWICS) have been low. This initiative, commenced July 2023, aimed to equitably achieve 2380 referrals by March 2024, using an innovative data informed, digitally enabled primary care and population health management (PHM) collaborative, Protect-NoW.
Method: Data sharing agreements were established with participating practices. Eligible adults were invited by text or letter to take up the DWMP offer by accessing an online portal or by contacting supporting call handlers. Referrals for consenting individuals were processed by the registered practice. Pseudonymised data for service evaluation, including age, sex, body mass index (BMI), diabetes and hypertension diagnoses and deprivation decile, were extracted from clinical systems using ECLIPSE, an NHS registered data management tool commissioned to support PHM initiatives in NWICS.
Results: Data are for 06 July 2023–06 November 2023. Invitations were sent to 12,812 eligible people registered with 21 practices. Of 8428 resulting contacts, 2692 (31.9%) people requested referral. This compared to 129 referrals throughout 2022/23 financial year. Mean age of those requesting referral was 59 (SD ± 12) years and 1253 (46.5%) were male. 29 were people with type 1 diabetes, 499 with type 2 diabetes, 1448 with hypertension and 714 with diabetes and hypertension. 702 (26%) were people living in the most deprived quintile, which compares to 16% across the NWICS population.
Conclusion: This innovative pathway facilitates equitable access to the NHS DWMP, addressing unmet need and health inequality.

P306 | Consultant delivered diabetes review and discharge service (DRDS): Cost and care improvements achieved by a new service introduced in a tertiary hospital

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Introduction: Introduction of a dedicated diabetes inpatient specialist nurse (DISN) team reduced Length of Stay (LoS) in inpatients with diabetes by 8% at our hospital. We postulated that bolstering this with an additional consultant delivered diabetes review and discharge service (DRDS) working in collaboration with and supporting the DISN and specialist trainee teams with decision making would provide further LoS reductions.
Intervention: We instituted a 7-day consultant delivered service which included: review of select referrals directed specifically to the diabetes specialist doctor team, review of inpatients with severe hyperglycaemia (1 blood glucose reading above 18 mmol/L) or hypoglycaemia in the preceding 24h identified by automated Business Intelligence (BI) team generated lists, and daily in-reach to the acute floor.
Results: From November 2022 to January 2023, 59% of 'doctor' referrals ($n=92$) were seen by a consultant. Separately, 268 consultant reviews were performed for patients not referred to the diabetes team.
LoS for all inpatients with diabetes pre and 3 months post intervention was 8 days and 7 days, respectively (12 days vs 8 days for patients with a primary diabetes diagnosis), translating into an annual estimated saving of £4.2 million.
Meanwhile, these figures remained unchanged at 6 days for all inpatients.
There were reductions in inpatient mortality (21.5%,), 30-day mortality (13.7%) and 30-day emergency readmission rates (3.5%) for diabetes inpatients pre and 3 months post intervention.
Conclusion: Consultant delivered diabetes care achieves significant cost and patient care benefits, over and above that already achieved by a dedicated and competent DISN team.

P307 | Consultant delivered Diabetes Review and Discharge Service (DRDS): Early proactive identification and subsequent consultant review of inpatients with poor glycaemic control avoids patient harm

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Introduction: A significant proportion of inpatients with poor diabetes control are not referred to inpatient diabetes teams. We hypothesised that identifying this cohort of patients and intervening in their diabetes care would be beneficial.
Methodology: Automated lists of inpatients with hyperglycaemia (one capillary blood glucose CBG reading above 18 mmol/L) and moderate hypoglycaemia (CBG reading between 2.5 and 3.5 mmol/L) in the preceding 24h, generated daily at 8 am, were set up through the trust Business Intelligence Team. Patients on the list who were not on the diabetes ward and those not already known to the diabetes medical or nursing teams via prior referrals were deemed eligible for remote diabetes consultant review as part of a dedicated consultant delivered DRDS.
Results: Hyperglycaemia: Between 07 November 2022 and 11 December 2022, 565 patients were identified. 36% were eligible for review. Of these 34% were reviewed. An intervention was undertaken on 65% of those occasions. The most common interventions were commencing basal insulin, increasing the doses of basal insulin and addition or restarting of an oral hypoglycaemic agent.
Hypoglycaemia: 188 patients were identified. 44% were eligible for review. Of these 51% were reviewed. An intervention was undertaken on 52% of those occasions. The most common intervention was reduction in doses of basal insulin.
Consultant interventions directly led to avoidance of patient harm in 60 episodes of hyperglycaemia or hypoglycaemia (9%).
Conclusion: Having a system for early identification and consultant intervention in episodes of poor glycaemic control in inpatients has beneficial effects on patient care.

P308 | Protect-now diabetes prevention: A novel data informed, digitally enabled, system-wide primary care population health management (PMH) collaborative supporting access to the NHS diabetes prevention programme (NDPP) during the Covid-19 pandemic

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Aim: In August 2020, NHS England issued a directive to restore NHS services, to develop digitally enabled pathways, accelerate preventative programmes, increase inclusion, collaboration and reduce health inequalities. During the pandemic, this novel data informed, digitally enabled pathway was developed to support equitable access to the NHS NDPP for adults living in Norfolk and Waveney (NW) with established Non-Diabetic Hyperglycaemia (NDH) at risk of developing type 2 diabetes.
Method: Working under the Control of Patient Information (COPI) notice, eligible adults with NDH were sent letters with information about the NDPP and encouraged to express an interest by accessing an online portal. Supporting call handlers proactively contacted individuals who had not accessed the portal to offer support and encourage uptake. Programme roll out focused on areas of socioeconomic deprivation. NDPP referrals were made for consenting individuals. Pseudonymised data for age, sex, BMI and deprivation were collected for service evaluation.
Results: Between 01 January 2021 and 11 February 2022, 17,654 adults registered with 99 practices were sent invitations. 5728 (32.4%) expressed an interest and were referred to NDPP. Of these 2658 (46.4%) were male, and mean age was 64.8 (SD ± 9.2) years. 1218 (21.3%) were people living in the most deprived quintile, compared to 16% across the N&W population.
Of 5362 referrals processed by the provider, 2598 (48.4%) people completed an Initial Assessment (IA), with 1854 (34.6%) commencing a programme, which was more than by either GP or direct self-referrals.
Conclusion: During this phase of the pandemic, our novel pathway generated more NDPP referrals than established pathways and simultaneously addressed health inequality.

Clinical care and other categories posters: Support services

P309 | Characterising psychosocial determinants of health in patients admitted with hyperglycaemic emergencies at an Inner London Hospital

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Aim: The aim of the study was to characterise the psychosocial determinants of health (PSDOH) in patients admitted to hospital with different hyperglycaemic emergencies.
Methods: A retrospective medical records review was undertaken of all patients aged >16 years, presenting to an inner London hospital with a hyperglycaemic emergency between 01 January 2021 and 31 December 2021.
Results: One hundred thirty-nine patients were identified. 61 (44%), 11 (8%), 36 (26%) and 31 (22%) patients presented with diabetic ketoacidosis (DKA), hyperosmolar hyperglycaemic state (HHS), mixed DKA/HHS and non-DKA/non-HHS hyperglycaemia respectively. HHS patients were older (median age (interquartile range (IQR): 73 (59–89) years) ($p < 0.001$)), more comorbid (Charlson Comorbidity Index ≥5: $n = 9$ (75%) ($p < 0.001$)), more likely to have dementia or cognitive impairment: $n = 7$ (58%) ($p < 0.001$) and were more likely to be severely frail or terminally ill (Rockwood Clinical Frailty Scale 7–9: $n = 5$ (42%) ($p < 0.001$)). Patients presenting with DKA were younger (median age (IQR): 46 (29–60) years), less comorbid ($p < 0.001$) and less frail ($p < 0.001$), but more likely to have a serious mental health condition: $n = 23$ (38%) ($p = 0.001$). Patients of black ethnic minority were over-represented in those presenting to hospital with hyperglycaemic emergencies ($n = 72$ (50.7%)) compared with the local population (24%–25%). This appeared to be independent of deprivation index. 59 patients (42%) had their HbA1c checked within 12 months of admission, 39 (64%) of which were measured in primary care.
Conclusion: Patients presenting with different hyperglycaemic emergencies experience very different PSDOH with distinct phenotypes emerging from this data. This characterisation provides valuable information to identify vulnerable patients that may benefit from targeted interventions to prevent those emergencies.

Clinical care and other categories posters: Type 1 diabetes

P310 | Moving predictions to practice: Type 1 diabetes insights

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Refer to Oral number A1.

P311 | The relationship between glycaemic markers/insulin resistance and eating disorders in individuals with type 1 diabetes

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Aims: This study aims to investigate the relationship between glycaemic markers/insulin resistance and eating disorder scores in young adults with type 1 diabetes.
Methods: The DEVELOP observational study recruited adults with type 1 diabetes who completed validated questionnaires to assess patient-reported outcomes (PROs), including the Eating Disorder Examination Questionnaire Short (EDE-QS) and Eating Disorder Screening (DEPS-R). Glycaemic markers studied included HbA1c, time in range (TIR), time below range (TBR), time above range (TAR), while glycaemic variability was assessed as glucose coefficient of variation (CV). Insulin resistance was assessed using estimated glucose disposal rate (eGDR).
Results: Eighty-three participants with type 1 diabetes, aged 24.69 ± 3.47 (37% females) completed the measures. Results showed no significant relationship between HbA1c and TIR with any of the PROs studied. However, when analysing by tertile, there was a significant difference between low and high groups in TBR ($p = 0.028$) and TAR ($p = 0.013$) with DEPS-R. There was also a significant relationship between low and high CV groups with both eating disorder measures (EDE-QS $p = 0.035$, DEPS-R $p = 0.007$). Furthermore, females exhibited a higher risk of encountering eating-related problems than males (EDE-QS $p = 0.004$; DEPS-R $p = 0.021$).
Conclusions: Low glycaemic variability and increased insulin resistance are associated with more problematic eating difficulties in individuals with type 1 diabetes. Females show a higher propensity to experience eating difficulties. Further studies are required with more diverse groups of type 1 diabetes, using more in-depth measures to fully understand the relationship between glycaemic measures and eating disorder symptoms and the best way to manage these as part of integrated care for diabetes.

P312 DUK | Getting it right from the start: Classification models for type 1 and type 2 diabetes have high accuracy at diabetes diagnosis

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Refer to Oral number A3.

P313 DUK | Early c-peptide measurement assists diabetes classification and prediction of insulin requirement in adult-onset diabetes

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Refer to Oral number A4.

P314 | Personalised basal tuner (PBT): Towards optimising basal insulin rates in people with type 1 diabetes

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Aims/Objectives: Basal rates (BR) represent 30% to 50% of total daily insulin. However, measuring their impact on glucose released by organs remains challenging. Our vision is an adaptive algorithm using Continuous Glucose Monitoring data to build composite days based on insulin and blood glucose (BG) to suggest hourly BR changes to better mirror an individual user's needs. This paper presents the first step towards this vision.
Methods: The OhioT1DM data set is used on this algorithm, starting by removing bolus insulin profiles and computing BG levels to see how much people are out given current BR suggestions. Simulation of action profiles is carried out using Rayleigh's Probability Density Function to discern the delay and its impact on changes in pre-programmed insulin rates. Finally, physical activity is analysed for accurate analysis.
Results: The analysis of six individuals' data reveals that 88% of BG values without external effects are correlated with wrong BR, ranging from −20 to 30 mg/dL (−1.1 to 1.6 mmol/L) with a daily cumulative average of 116 mg/dL (6.4 mmol/L) with values as extreme as 167 mg/dL (9.2 mmol/L). Simulated profiles show constant delays between the actual effect of insulin and the BG levels, especially in changes above 0.3 U. Activity results show that BR were not correct in periods of low physical activity.
Conclusions/Summary: These findings emphasise the role of fine-tuning BR for better BG control, which is the main goal of our vision, future work will be on suggesting BR based on these results.

P315 PC | What's in a name? Improving latent autoimmune diabetes in the adult (LADA) diagnosis in primary and community care settings

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Background and Aims: Accurate classification of people with diabetes is essential for optimal management and improved patient outcomes. LADA or type 1.5 diabetes occurs in 2–12% of people with adult-onset diabetes. Our aim was to review the prevalence and clinical and biochemical characteristics of patients diagnosed with LADA within our North West London community diabetes service.
Methods: Approximately 1100 people with type 2 diabetes are referred annually to our community diabetes service from primary care. A 12-month retrospective case review (2022–2023) identified six patients who were reclassified as LADA by the multidisciplinary team following detailed assessment of medical history, clinical phenotype and glutamic acid decarboxylase autoantibody (GADA) measurement.
Results: Six people (three female, one White Caucasian, five South Asian), who were originally diagnosed with type 2 diabetes, were reclassified as LADA. Mean age was 56.8 years (range 47–65) and mean BMI 25.0 kg/m^2 (range 21.8–28.6). Mean duration of type 2 diabetes was 12.6 years (range 0.5–20) with mean HbA1c at reclassification of 99 mmol/mol (range 64–166). Mean GADA concentrations were 24.3 U/mL (range 1.3–86.6). Two patients had family history of type 1 diabetes, and three had hypothyroidism or ulcerative colitis. Three patients were already on insulin therapy.
Conclusion: Diagnosis of LADA requires a high index of clinical suspicion with review of personal and family history of autoimmune disease, assessment of clinical phenotype and GADA measurement to confirm diagnosis. Reclassification improves personalised approach to care although gaps in knowledge remain regarding optimal management of LADA.

P316 | Interventions to preserve beta cell function in patients with newly diagnosed type 1 diabetes: A systematic review and network meta-analysis of non-antigen-specific immunotherapies

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Introduction: Type 1 diabetes is characterised by destruction of pancreatic beta cells. Many therapies have been trialled in newly diagnosed patients with the goal of preserving beta cells. A systematic review and network meta-analysis (NMA) was undertaken to compare the effectiveness of these interventions.
Methods: RCTs of non-antigen specific interventions in newly diagnosed (≤3 years) people with Type 1 diabetes which measured beta cell function via c-peptide were identified in Embase, MEDLINE, Cochrane CENTRAL and trial registries (up to 3rd August 2023). Risk-of-bias was assessed using Cochrane Risk of Bias tool (v1). A frequentist NMA was undertaken in R using placebo or equivalent as the common comparator.
Results: Twenty-five trials, reporting on 28 interventions, were included in the NMA of c-peptide 2 and 4 h AUC. In the main analysis, four interventions demonstrated statistically significantly higher AUC c-peptide level than placebo at 12 months (interferon alpha 5000 IU, anti-tnf golimumab, ATG and teplizumab), though significant heterogeneity was present (I^2 67%). In sensitivity analyses (e.g. low risk of bias, use of either 2 or 4 h AUC when both reported), statistical significance and ranking of interventions were not always consistent.
Discussion: This novel NMA demonstrates that several interventions show statistically significantly higher levels of c-peptide AUC vs comparator at 12 months. However, this was often based on a single trial (golimumab, interferon alpha) and small sample sizes with substantial uncertainty. Nevertheless, these findings are important for highlighting the most promising interventions that should be studied further with a view to preserving beta cells in people with newly diagnosed type 1 diabetes.
Acknowledgements: Additional authors that were part of the study team; Dr L Quinn, Dr T J Horgan, R Garda, from University of Birmingham.

P317 | Learning from a feasibility study investigating the impact of frailty on glycaemia in older adults with type 1 diabetes

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Refer to Oral number A8.

P318 | Sodium-glucose cotransporter-2 inhibitor (SGLT-2i) use in type 1 diabetes: A treatment worth revisiting?

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Aims: Dapagliflozin was approved for treatment in type 1 diabetes in 2019. The indication was eventually withdrawn due to commercial reasons and not safety concerns. Following this, we aimed to perform a safety audit on the advice of local prescribing committee to ensure safe practice and assess the effect of SGLT2i on clinically important parameters.
Methods: We retrospectively analysed health records of 28 PWT1 who commenced SGLT-2i prior to the change in guidelines. HbA1c, weight, glucose variability (GV), time below range (TBR), time in range (TIR) and incidence of diabetic ketoacidosis (DKA), urinary tract infections (UTI) and discontinuation rate were measured over a 12-month period following treatment initiation.
Results: Advice regarding the risk of DKA and UTI was given to all patients. Mean weight loss from baseline was 4.9 kg (95.5 to 88.6 kg; $p=0.16$; $n=20$), mean HbA1c reduction was 0.73% (9.9% to 9.25%; $p=0.03$; $n=9$), mean GV decreased by 6.75% (42.1% to 35.3%; $p=0.14$; $n=5$), mean TIR increased by 13.8% (40.9% to 54.19%; $p=0.28$; $n=5$) and mean TBR increased by 1.96% (1.14% to 3.1%; $n=5$; $p=0.03$) over the studied period. Discontinuation rate was 50% ($n=14$) due to change in regime ($n=5$), vaginal thrush ($n=1$), hospitalisation with DKA ($n=1$) and inadequate response ($n=1$). One patient developed UTI which did not result in discontinuation.
Conclusion: Treatment with SGLT-2i may lead to improvement in patient-important parameters. Considering

the license expansion of dapagliflozin in chronic kidney disease and heart failure, further research is required into its safety and efficacy as an adjunctive treatment in selected PWT1 with appropriate education and safety netting.

P319 | Glycaemic outcomes in young people (YP) with type 1 diabetes in two South London boroughs

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Aim: The aim of the study was to characterise a cohort of YP with type 1 diabetes in two South London boroughs under specialist YP diabetes services.
Methods: YP age 16–24, with type 1 diabetes, known to YP diabetes services in tertiary care and with GP or family home in Lambeth or Southwark were included. Data for 2022 were extracted including: gender, ethnicity, indices of multiple deprivation (IMD), clinic attendance, hospital admissions, HbA1c, use of diabetes technology. Data were collected as baseline for NHSE Transition and Young Adult (TYA) diabetes pilot.
Results: Of 163 YP, 52% female; 72% live in the two most deprived IMD-quintiles; ethnicity: 36% – Black, 9% – mixed, 23% – White, 32% – other and unknown.
73% attended at least one, and 52.8% at least 2, face-to-face YP clinics in 2022. 15.3% had no contact with the specialist team although the team had contacted them. 14.1% had a least 1 diabetes-related emergency admission, 7.4% for diabetic ketoacidosis.
87% had HbA1c recorded. Mean HbA1c 75 mmol/mol. HbA1c <53 mmol/mol = 12.3%, 53–86 mmol/mol = 53.4%, >86 mmol/mol = 21.5%. Wearable glucose monitors were provided 74.2%: intermittently scanned 54%, real-time continuous glucose monitoring (RT-CGM) 20.2%. Insulin pumps were used by 27.6%: stand-alone 19%, hybrid closed loop 9.2%.
Conclusion: This multi-ethnic cohort of YP with type 1 diabetes living in areas of high deprivation have HbA1c considerably above target and a high rate of diabetes-related hospital admissions. Diabetes technology use is higher than reported in National Diabetes Audit (2021–2022). Care needs to be personalised to take account of the unique set of challenges this cohort of YP face when accessing healthcare.

Clinical care and other categories posters: Type 2 diabetes

P320 | Achievement of HbA1c and weight targets in adults with type 2 diabetes on once weekly (OW) glucagon-like peptide-1 receptor agonist (GLP-1 RA) therapy in UK primary care

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Refer to Oral number A21.

P321 | Modelling the long-term costs and health gains from a group-based diabetes education and weight loss intervention in people with newly diagnosed type 2 diabetes: An economic evaluation of the glucose lowering through weight management (GLOW) trial

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Refer to Oral number A22.

P322 | Practice level intervention shows benefit in reducing the number of delayed glycated haemoglobin (HbA1c) monitoring tests in UK general practice: Initial results of a cluster intervention

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Introduction: The timeliness of HbA1c monitoring tests has been shown to be an independent determinant of the level of HbA1c achieved. Systems to optimise HbA1c test frequency and interval are therefore needed.
Methods: In Cambridgeshire UK, a system was put in place to facilitate effective use of pathology services in primary care. From October 2020, out of 111 general practices, on a monthly basis, 60 were sent a list of those individuals with HbA1c >75 mmol/mol who were overdue their HbA1c test by more than 3 months and those with HbA1c ≥58 mmol/mol who were overdue by more than 6 months, so that the practice could take appropriate action. A comparison was made with the 51 practices not receiving the list (cluster intervention).
Results: There was a total of 110,278 tests in 56,868 managed diabetes individuals of whom 23,099 were deemed at high risk (HbA1c ≥58 mmol/mol). Over a 12-month period, 34.0% of those in practices receiving the late-HbA1c-test list (intervention) remained overdue compared with 47.4% ($p < 0.001$) in those not receiving the list. There was a corresponding difference in the mean overdue days at 121 days (95% CI 113–130) for the intervention practices vs 214 (95% CI 191–237) days for the non-intervention practices ($p < 0.001$). Linear regression showed that the effect remained significant after adjustment for age >65 years, male sex, practice list size, % diabetes on the practice list and practice deprivation score (both $p < 0.001$) ($r^2 = 0.3$).
Conclusion: Here, we provide preliminary evidence for the benefit of a laboratory-led programme to flag those who are overdue their HbA1c test in relation to ensuring timely monitoring/potential intervention.

P323 | The effects of preoperative glycaemic control on bariatric and metabolic surgery outcomes: Data from a tertiary-referral bariatric centre in the United Kingdom

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Aims: Current recommendations advocate the achievement of an optimal glucose control (Glycated haemoglobin [HbA1c] <69 mmol/mol) prior to elective surgery to reduce risks of peri- and post-operative complications, but the relevance for this glycaemic threshold prior to Bariatric Metabolic Surgery (BMS) remains unclear. We sought to perform a study assessing the correlation of glycaemic control with outcomes.
Methods: We undertook a retrospective cohort study of patients with type 2 diabetes (T2D) who underwent BMS over s 6-year period (2016–2022) at a regional tertiary referral following completion of a specialist multidisciplinary weight management. Post-operative outcomes of interest included 30-day mortality, readmission rates, need for Intensive Care Unit (ICU) care and hospital length of stay (LOS) and were assessed according to HbA1c cut-off values of <69 ($n = 202$) and >69 mmol/mol ($n = 67$) as well as a continuous variable.
Results: A total of 269 patients with type 2 diabetes were included in this study. Patients underwent primary Roux-en-Y Gastric Bypass (RYGB, $n = 136$), Sleeve Gastrectomy (SG, $n = 124$), insertion of gastric band ($n = 4$) or one-anastomosis gastric bypass (OAGB, $n = 4$). No significant differences in the rates of complications were observed between the two groups of pre-operative HbA1c cut-off values. No HbA1c threshold was observed for glycaemic control that would affect the peri- and post operative complications following BMS.
Conclusions: We observed no associations between pre-operative HbA1C values and the risk of peri- and post-operative complications. In the context of a specialist multidisciplinary weight management programme, optimising pre-operative HbA1C to a recommended target value prior to BMS may not translate into reduced risks of peri- and post-operative complications.

P324 | Effectiveness of dietitian led type 2 diabetes management: A review

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Background: With an increasing prevalence of type 2 diabetes in children and young people (CYP), studies are in progress to develop the most appropriate technique for remission, out of which meal replacement or low-calorie diet seems unsustainable in CYP. However, evidence continues to suggest diet and lifestyle change is the cornerstone for type 2 diabetes treatment.
Aim: The aim of the study was to determine the effectiveness of dietitian led intervention for type 2 diabetes management and its use as a tool in CYP for remission using sustainable approach.
Methods: A systematic search of four databases was conducted to identify studies reporting randomised controlled trails (RCTs) utilising dietitian led intervention for type 2 diabetes. All identified studies were based on adult population while no study was found on paediatric group.
Results: HbA1c was considered as a primary measure in all reviewed studies. A significant difference ($p < 0.05$) was noted between control (receiving normal care) and intervention group (receiving structed dietitian led education program) in all RCTs, except for one study done in United States ($p = 0.573$). Secondary outcomes were also noted: improved macronutrient intake ($p < 0.001$), decreased cholesterol ($p < 0.05$), tri acyl glycerides ($p < 0.05$) and body mass index ($p < 0.001$).
Conclusion: For standard treatment provision, there needs to be a pathway translating dietitian led management of newly diagnosed CYP with type 2 diabetes to maximise the utilisation from medical nutrition therapy to increase the chances of type 2 diabetes remission.

P325 | Eating behaviours in overweight Indians with type 2 diabetes: Data from Practo-Transform digital diabetes management programme (DMP) in India

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Aims: Practo-Transform-DMP is a 6-month digital programme designed to optimise the management of type 2 diabetes among Indians. We aim to investigate the eating behaviours of high-risk patients with type 2 diabetes.
Methods: Inclusion: All participants of Transform with Type 2 diabetes/prediabetes, aged 18–70 years between July to November 2023.
Exclusion: Type 1 diabetes, pregnancy, and advanced systemic illnesses. The TFEQ-R18 questionnaire measured Uncontrolled Eating (UE), Cognitive Restraint (CR) and Emotional Eating (EE) (excluding Q18 for clarity) on a 4-point Likert scale. TFEQ-R18 instructions were used to convert raw scores to percentages (0–100) with higher scores indicating more of the behaviour.
Results: From July to November 2023, 389 participants, aged 18–70 years with type 2 diabetes/prediabetes, were studied. Of which 108 (28%) were females and 281 (72%) were males. The average age of participants was 44 years (=11.03) and BMI was 28 kg/m^2 ($\sigma = 5.2$). The means and Standard Deviations of uncontrolled eating, cognitive restraint and emotional eating were 33.76 ($\sigma = 19.5$), 40.29 ($\sigma = 19.4$), and 27.6 ($\sigma = 25.3$) respectively. No significant correlation between BMI and uncontrolled eating or cognitive restraint was found in overweight patients. Emotional eating showed a significant positive correlation with BMI ($p = 0.001$).
Conclusion: High-risk Indian overweight patients with diabetes exhibit significant emotional eating habits, high TFEQ-R18 scores for cognitive restraint and uncontrolled eating. The first report of TFEQ scores in this population suggests the need for targeted interventions.

P326 | Targeted kidney protection: Tailored SGLT2-inhibitor therapy in type 2 diabetes

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Aims: It is unclear how much SGLT2-inhibitors reduce absolute risk of kidney failure in people with type 2 diabetes without chronic kidney disease (CKD). We employed and validated an innovative approach to identify individuals who could derive clinically relevant renoprotective benefit from SGLT2 inhibitors.
Methods: We studied 113,310 adults with type 2 diabetes without pre-existing cardiovascular disease, heart failure or CKD, who started SGLT2-inhibitors (19%), DPP4-inhibitors (40%), or sulfonylureas (41%) in UK primary care (Clinical Practice Research Datalink, 2013–2020). We estimated individual-level absolute risk reduction (ARR) and

number-needed-to-treat (NNT) with SGLT2-inhibitors by using CKD Prognosis Consortium risk scores for two outcomes (developing eGFR <60 mL/min/1.73 m^2, and 40% decline in eGFR/end-stage kidney disease [ESKD]) combined with the 38% lower relative risk of kidney failure from published trial meta-analyses. Model predictions were validated against observed outcomes.

Results: Model-predicted and observed overall outcome incidence were similar (5.1% vs 5.1% for eGFR <60 mL/min/1.73 m^2 and 0.52% vs 0.64% for 40% decline in eGFR/ESKD). Individuals in the highest risk quintile of eGFR <60 mL/min/1.73 m^2 had an ARR of predicted 5.2% and observed 10.9% (95% CI 7.1–14.8) with SGLT2-inhibitors compared with sulfonylureas, corresponding to a NNT of 9 (95% CI 7–14). Conversely, the NNT with SGLT2 inhibitors was non-significant in the lowest risk quintile (predicted 257, observed 433 [95% CI 163–∞]). We found a similar pattern for outcome 40% decline in eGFR/ESKD (NNT in highest risk decile 59 [95% CI 34–213], NNT in lowest risk decile 855 [95% CI 326–∞]).

Conclusions: Our innovative approach identifies individuals who can derive meaningful renoprotective benefit from SGLT2 inhibitors, enabling personalised treatment decisions.

P327 | Composite microvascular risk and its association with HbA1c in individuals with type 2 diabetes followed from diagnosis: A large UK observational cohort study

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Background: HbA1c is an independent risk factor for microvascular complications, but few recent studies have followed patients from diagnosis of type 2 diabetes. We aim to evaluate if the lowest target level for HbA1c of <48 mmol/mol is associated with lower risk of microvascular complications in the context of modern treatment strategies.

Methods: Data from the Clinical Practice Research Datalink and Hospital Episode Statistics were used to identify individuals with incident type 2 diabetes from 1998 to 2007. A composite microvascular outcome was defined as the first new diagnosis of neuropathy, nephropathy or retinopathy. A multivariate time-varying Cox regression analysis was performed to assess the risk of microvascular disease associated with HbA1c at six different levels (~11 mmol/mol [1.0%] intervals). HbA1c 42–53 mmol/mol was defined as the reference.

Results: In total 109,309 individuals, mean ± SD age 62.7 ± 14.0 years, 54.5% female, 5.5% known ethnic minority, were included in our analysis. Average follow-up duration was 5.4 years. Risk of composite microvascular disease increase with HbA1c levels. HbA1c ≥86 mmol/mol was associated with the highest risk for both composite and individual outcomes; Composite (hazard ratio 2.07, 95% CI 1.70–2.52); Retinopathy (1.81, CI 1.45–2.26); Neuropathy (1.99, CI 1.67–2.36); Nephropathy (1.30, CI: 1.13–1.49). The lowest risk was observed with HbA1c levels <42 mmol/mol for all complications; Composite: (0.93, 0.70–1.14); Retinopathy: (0.91, 0.76–1.09); Neuropathy (0.95, 0.81–1.10); Nephropathy (1.03, 0.95–1.12).

Conclusion: Risk of composite and individual microvascular complications was lowest at HbA1c level in the non-diabetes range. This highlights the importance of achieving and maintaining tight HbA1c target from diagnosis to reduce risk of long-term complications of type 2 diabetes.

P328 | The use of freestyle libre (FSL) 2 leads to a reduction in HbA1c in people with type 2 diabetes with different ethnicities

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Aims: The aim of the study was to assess the compliance with FSL Sensor initiation in relation to current NICE guidelines for patients with type 2 diabetes and determine the impact of sensor use on glycaemic control.

Methods: A retrospective audit of 100 consecutive patients started on a FSL Sensor between January and December 2022 at Manchester University NHS Foundation Trust. Clinical and demographic parameters were taken at baseline and 6 months.

Results: 50% of patients were commenced on FSL by a Doctor vs Diabetes Specialist Nurse. 42/58% of patients were female/male. The ethnicities included – 33%

White British, 32% Asian, 10% Black African, 9% Black Caribbean, 16% other or not stated.

71% of patients had a HbA1C reduction by 6 months with 25% having a reduction >20 mmol/mol.

58% of patients were not-eligible according to NICE guidelines. They had a 72% HbA1c reduction in HbA1C at 6 months:

- 35% had a reduction of between 5 and 19 mmol/mol with a mean starting HbA1c of 70 mmol/mol.
- 13% had a reduction of between 20 and 39 mmol/mol with a mean starting HbA1c of 85 mmol/mol.
- 52% had a reduction greater than 40 mmol/mol with a mean starting HbA1c of 105 mmol/mol.

Conclusion: 72% of non-eligible patients from different ethnicities had a HbA1c decrease with FSL use which indicates that the decision to prescribe off NICE guidelines was proven to be effective in their overall glycaemic control. Clinical decision making plays an important role in determining the use of technology for diabetes management in people with type 2 diabetes.