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100. Patterns of autoimmunity of genetically defined adult onset type 1 diabetes are different above and below 30 years of age, without impacting on presentation

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Background and aims: Robustly identifying adult onset type 1 diabetes (T1D) clinically is difficult and means the rates of autoantibody positivity and clinical features at diagnosis are unclear. Using an unbiased genetic methodology,[1] we aimed to define patterns of autoantibody positivity and clinical characteristics of T1D presenting above and below 30 years of age.

Methods: We used a T1D genetic risk score (T1DGRS) to define T1D in 1,107 white Europeans with diabetes in the STARTRIGHT study (inclusion criteria: diagnosis age ≥18, ≤12 months diabetes duration). We compared autoantibodies (GAD, IA-2, ZNT8) and clinical characteristics at presentation in genetically defined T1D diagnosed above and below 30 years of age.

Results: T1D was genetically defined in 23% (207/887) and 66% (146/220) of participants diagnosed >30 and ≤30 years of age, respectively. Overall, autoantibody positivity (≥1 autoantibody positive) (89.4% vs 89.7%) and GAD (86.5% vs 79.3%) were similar between age groups (both p>0.05). Those diagnosed older were less likely to have IA-2 (34.3% vs 50.3%), ZNT8 (41.3% vs 52.4%), therefore multi-antibody (≥2) positivity (47.8% vs 60.7%) (all p<0.05). However, the severity of presentation of T1D above and below 30 years of age was near identical: HbA_{1c} (102.1 mmol/mol vs 97.2 mmol/mol), glucose (21.6 mmol/L vs 19.7 mmol/L), DKA (26.5% vs 27.7%) and weight loss (74.0% vs 74.8%) (all p >0.1).

Conclusions: We show that, whilst rates of single autoantibody positivity are unaffected by age of T1D diagnosis, differences in the pattern of individual antibody positivity exist. Despite this, age of diagnosis has no impact on the severity of presentation of T1D.

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101. Efficacy of GLP-1 analogues at different baseline levels of HbA_{1c} in T2DM: a systematic review and meta-analysis

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Background: Glucagon-like peptide-1 receptor analogues (GLP-1a) are a group of medications used in treating type 2 diabetes mellitus (T2DM) with added beneficial effect on weight and blood pressure since 2005. In this systematic review and meta-analysis, we gathered evidence to show whether the baseline level of glycosylated haemoglobin (HbA_{1c}) predicts the efficacy of GLP-1a in T2DM.

Aim: Baseline levels of HbA_{1c} predict the efficacy of GLP-1a in T2DM. The aim of this systematic review and meta-analysis is to assess the efficacy of GLP-1a at different levels of baseline HbA_{1c} in T2DM.

Method: Five electronic databases were searched: MEDLINE (1990–July 2014), EMBASE (1990–July 2014), Cochrane Central Register of Controlled Trials (Issue 6 of 12 June 2014), SCOPUS (1990–2014) and Web of Science Core Collection (1990–2014) and abstracts proceedings. Trials were included if they were randomised, controlled and involved one or more of the GLP-1a in clinically relevant doses compared with placebo and/or other glucose-lowering agents except GLP-1a. The identified trials were stratified according to level of baseline HbA_{1c}.

Results: Thirty-three trials met the inclusion criteria. RCTs were stratified into the predefined groups of baseline levels of HbA_{1c}. GLP-1a showed more efficacy against placebo at higher baseline levels of HbA_{1c} (absolute reductions of HbA_{1c} were –1.06%, –0.79% and –0.63% at baseline levels of HbA_{1c} 8.5–8.99% (69.4–74.8 mmol/mol), 8.0–8.49% (63.9–69.3 mmol/mol) and 7.5–7.99% (58.5–63.8 mmol/mol), respectively). When GLP-1a were compared with insulin and/or insulin secretagogues, the efficacy of GLP-1a was outweighed by those comparators at higher levels of baseline HbA_{1c} ≥9.0% (≥74.9 mmol/mol), indicating a good role for those medications at higher HbA_{1c} profile.

Conclusion: GLP-1a are highly efficacious glucose-lowering agents at any level of baseline HbA_{1c}. The pooled data showed that the efficacy of GLP-1a increases at higher baseline levels of HbA_{1c} in T2DM.

102. Which baseline characteristics predict response to canagliflozin? Updated results from the ABCD Nationwide Canagliflozin Audit

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Background: The ABCD nationwide audit programme has already demonstrated that significant improvements in HbA_{1c}, weight, alanine aminotransferase (ALT) and blood pressure translate from randomised controlled trial evidence into our real-world cohort of patients. It is possible that patients with different characteristics may have larger improvements in HbA_{1c} and weight than others, and thus stand to gain the most benefit.

Methods: Data were extracted from the ABCD Nationwide Canagliflozin Audit programme. Multiple linear regression was used to identify significant predictors of HbA_{1c} response and weight loss following treatment using Stata SE 16.
Results: 730 datasets were included with average (mean±SD, unless stated) baseline characteristics as follows: age 61.3 years (±10.8), eGFR 76.7 mL/min/1.73 m^2 (±13.9), weight 97.6 kg (±22.2), BMI 32.6 kg/m^2 (±6.5), HbA_{1c} 73.6 mmol/mol (±17.0) and median (IQR) duration of diabetes 6.7 years (1.6–11.9). Significant positive predictors of HbA_{1c} reduction included eGFR (b=0.12, p<0.001) and baseline HbA_{1c} (b=0.57, p<0.001). Higher ALT level predicted greater reduction in HbA_{1c} (b=0.05, p<0.05) but by a relatively small amount. Longer duration of diabetes was a negative predictive factor for HbA_{1c} response (b=–0.39, p<0.001). Only higher baseline weight predicted greater weight loss with canagliflozin (b=1.03, p<0.001). No other baseline characteristics were significantly associated with change in weight.
Conclusion: Our analysis suggests that those with higher HbA_{1c} and higher eGFR tend to have a larger reduction in HbA_{1c}. ALT level may also be a weak predictor of HbA_{1c} reduction. Those with longer duration of diabetes tend to have a smaller reduction in HbA_{1c} with canagliflozin than those with shorter duration. Only baseline weight was found to predict weight change, with those who are heavier at baseline experiencing greater weight loss.

106. Improving delays in time to diagnosis and treatment of diabetic ketoacidosis (DKA) in Sheffield Emergency Department: a quality improvement project in its second cycle

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Background and aims: Despite DKA being a manageable complication of diabetes, it persists as a cause of death. This quality improvement project aimed to identify where and why delays in recognition and management occurred and how this could be improved within Sheffield Emergency Department.
Method: Retrospective analyses of all cases of DKA (N=16) were made over two months. We established the timeline to key milestones including blood glucose, ketones, intravenous fluids and insulin. We targeted interventions at areas of longest delay and changes that could be feasibly implemented in a short timeframe. This included hard interventions (eg, ketone enabling blood glucose monitors) and soft interventions (eg, staff education). The cycle was repeated (N=19) and, where delays remained, new interventions formed. These are currently being implemented and include ensuring all medical patients have glucose testing and more focused education amongst specific staff groups.
Results: For patients presenting to Resus, the average time to blood glucose and ketone monitoring improved (10 and 14 min, respectively (2018); –2 and 1 min (2019)). This was reflected outside of Resus (48 and 44 min (2018), 23 and 22 min (2019)). This was the same for treatment times with intravenous fluid and insulin (40 and 43 min (2018) to 14 and 21 min (2019) within Resus) (100 and 126 min (2018) to 72 and 75 min (2019) outside Resus).
Conclusion: Focused analysis of this patient pathway has allowed targeted interventions to be implemented resulting in significant improvements in patient care over a short period of time.

107. The impact of using a joint Diabetes Specialist Nurse and Dietitian clinic for people with type 2 diabetes referred for insulin initiation

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Background: NICE suggests adopting an individualised approach to diabetes care that is tailored to the needs and circumstances of adults with type 2 diabetes (T2DM).[1] It is well documented that there is resistance from people with T2DM to start on insulin.[2] This might be due to insulin therapy being associated with adverse outcomes including weight gain, hypoglycaemia and reduced quality of life.[3] It is suggested revisiting lifestyle changes, even with insulin initiation with T2DM.[2] In our service, patients with T2DM who are referred to the Diabetes Specialist Nurses (DSN) for insulin initiation often decline starting on insulin. If the patient agrees, they would also be referred to a dietitian. We have found that the process of waiting plus an additional appointment often leads to non-attendance at dietetic clinics. This delays optimising blood glucose levels. Raised blood glucose levels can lead to both macrovascular and microvascular damage.[2]
Aim: To improve the process of seeing people with T2DM who are referred for insulin initiation and thereby reducing raised HbA_{1c} more quickly.
Method: A joint clinic by the DSN and dietitian was trialled, inviting people with T2DM who were referred for insulin initiation. The patients were then reviewed in 3 months. The effectiveness of the clinics was evaluated by reviewing HbA_{1c} before being seen and at their 3-month review. In these clinics, diet and lifestyle changes were strongly encouraged. Weight was measured but weight loss was not a target set with patients.
Result: During the trial period 35 patients attended. The average HbA_{1c} was 84 mmol/mol for patients when they were seen at their first appointment. At the follow-up clinics, on average a reduction in HbA_{1c} of 10 mmol/mol was seen (p<0.001). Of the 35 patients who attended, by their next appointment seven patients were started on insulin and four patients had their diabetes medications reduced (gliclazide). Four patients were started on GLP-1 mimetics at their first appointment. In two of the patients who were started on GLP-1 mimetics, HbA_{1c} increased at their follow-up clinic. One patient was started on SGLT-2 inhibitors and their HbA_{1c} deteriorated at their follow-up appointment. Patients were offered a variety of dietary approaches, however most of the patients opted for making small dietary and lifestyle changes. Some of the changes included swapping to lower glycaemic index foods and snacks, reducing excessive carbohydrate intake, establishing regular eating patterns and increasing physical activity in their daily lifestyle patterns. The majority of patients who attended dramatically reduced their HbA_{1c} and did not require insulin initiation. Other findings show that most patients have not accessed a dietitian over the last 7–8 years. Dietary changes, even if small, were far more powerful than medication in many of these cases. Having the nurse and the dietitian together added more emphasis to the lifestyle changes. The overall weight reduction was often minimal. When making lifestyle changes with a higher HbA_{1c}, weight loss was a less accurate marker of adherence to the diet and lifestyle changes and improvement of HbA_{1c}.
Conclusion: Diabetes is a complex condition requiring multidisciplinary team input. The importance of lifestyle changes to be optimised when insulin initiation is considered is well recognised. We have found having a joint DSN/Dietitian clinic helped improve HbA_{1c}

measurements and reduce waiting time. Even small reported lifestyle changes helped improve HbA_{1c}. Improvement of elevated HbA_{1c} was mostly not linked with weight loss.

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108. Evaluating the carbon footprint of Kettering General Hospital Diabetes and Endocrine Clinic

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Background: There is increasing evidence that particulate matter (PM) in air (air pollution) is associated with ill health, hospital admission and all-cause mortality. The main source of PM in Western countries is road transport. The aim of this study was to examine the potential carbon footprint of clinics at a district general hospital.

Method: A 2-week period at the start of September 2019 was evaluated to calculate the distance patients travelled to clinic compared with the distance to their GP. Distance was calculated using the fastest direct car route between the postcode of the GP and the postcode of the patient's home address. Due to the local geography and transport links, train travel was not considered feasible.

Results: 202 patients travelled a combined distance of 1,625 miles to be seen in clinic. The mean distance between the clinic and the patient's home was 8.0 miles, compared with 2.2 miles between patients' homes and their GP. 163 patients were seen in clinic in Kettering General Hospital and 39 in peripheral clinics.

Conclusions: Coming to hospital for an appointment has led to 404 more road journeys. Including the return journey, the 3,250 miles travelled is more than driving from Kettering to Baghdad. The study was limited as it was assumed that all patients would be traveling from their home address. While for some patients and some conditions this journey is unavoidable, wider options like increasing the number of virtual clinics and care offered closer to home would help further reduce the carbon footprint. Since the start of the COVID-19 pandemic in March 2020, all clinics have been converted to virtual clinics where possible. The change in practice has demonstrated that, for many patients, virtual consultations can be appropriate. There is a plan to maintain as many virtual clinics as possible in post-COVID practice.

109. Steroid-induced hyperglycaemia and diabetes on the haematology ward: are we getting it right?

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Aim: High doses of pulsed steroids are commonly used in haematological malignancies. Despite reported high risks of steroid-induced diabetes (SID) and steroid-induced hyperglycaemia (SIH), screening for SID/SIH is not consistently performed. We evaluated the screening of SID/SIH in patients admitted with haematological malignancies receiving steroids, before and after implementing a local guideline based on JBDS-IP guidelines.

Method: We collected data using a standard proforma based on the National Diabetes Inpatient Audit (NaDIA) on all patients admitted to the haematology ward receiving steroids over 2 months in 2018 (Group 1) and re-audited in 2019 (Group 2) after implementing two single-page guidelines on SID (for patients without known diabetes) and SIH (patients with known diabetes). Teaching sessions were delivered to haematology ward staff.

Results: 36 patients were included (18 in Group 1; 18 in Group 2). The average hydrocortisone equivalent dose/24 hours was 155 mg and 462 mg in Groups 1 and 2, respectively. Only 28% had appropriate monitoring of capillary blood glucose (CBG) in Group 1 compared with 94% appropriately monitored in Group 2. The overall prevalence of SID and SIH was 44% in Group 1 and 78% in Group 2. Nine out of 12 patients in Group 2 without known diabetes developed SID, five out of six patients with known diabetes developed SIH.

Conclusion: Haematology ward staff were not aware how to appropriately monitor CBG levels, especially in patients without known diabetes, underestimating the prevalence of SID/SIH. Following an awareness campaign through teaching and guideline implementation, there was improved CBG monitoring with an increased prevalence of newly diagnosed SID/SIH.

110. True costs of insulin pumps commonly used in Royal Devon and Exeter

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Background: Continuous subcutaneous insulin infusion devices, commonly known as insulin pumps, have expanded the treatment options of insulin-treated diabetes mellitus, especially type 1. There are currently different types of insulin pumps available on the market, differing in prices and features. The aim of this audit was to compare the actual costs of pump consumables with the quoted cost given by two suppliers (Medtronic and Roche) used by the Royal Devon and Exeter Hospital.

Method: Pump invoices were reviewed from December 2018 to May 2019 and the average monthly cost of consumables calculated for each patient. Data were collected for 193 patients (105 Medtronic and 88 Roche).

Results: The average monthly cost for Medtronic consumables was £155.45, with a quoted monthly cost of £120.60. With the inclusion of the pump cost, which for our centre is £2,800 with a 4 years guarantee, the total cost per year is £2,565 or £10,260 over 4 years. The average quoted cost for Roche consumables was £ 95.75 a month. The quoted monthly cost varied between £92.10 (Combo pumps) and £77.90 (Insight pumps). With the addition of the pump cost, £2,098.80 over 4 years, the average cost per patient is £1,673.70 a year or £6,694.80 over 4 years.

Conclusion: There are different factors to consider such as compatibility with continuous glucose monitoring and specific patient requirements that may be more important. However, there is a need for frequent review of pump costs and clinical outcomes due to the current pace of technology improvements.

111. Establishing the value of pre- and per-operative wound cultures in diabetes foot infection

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Aims: The role of pre- and per-operative wound cultures in diabetes foot infection (DFI) is controversial. We evaluated the value of pre-operative wound cultures and determined the correlation between pre- and per-operative wound cultures.

Methods: An observational study of patients who underwent foot surgery was undertaken between August 2017 and December 2018 for DFI. Data collected included baseline characteristics, surgical intervention, type and duration of antibiotic treatment. Microbiology results from pre- and per-operative wound swabs and tissue cultures were compared.

Results: 34 patients (mean (SD) age 62.7 (15) years) underwent surgery for DFI. Indications for surgery were: acute osteomyelitis (67.6%), soft tissue abscess (11.8%), non-healing ulceration (14.7%) and soft tissue infection (17.7%). Surgeries performed included: amputation of toes (26.5%), soft tissue debridement (26.5%), ray amputation (20.6%) and incision and drainage (8.8%). Pre-operative cultures grew *Staphylococcus* (40.6%), mixed skin flora (50.0%) and Gram-negative bacteria (21.9%). Per-operative cultures grew *Staphylococcus* (75%), Gram-negative (25%) and other organisms (31.3%). There was no change in pre- and per-operative culture results in 59.3% of patients. 50% of per-operative tissue cultures were polymicrobial. Mixed skin flora culture results decreased from 50% in pre-operative to 3.1% in per-operative cultures. 56% patients, who grew mixed skin flora in pre-operative cultures, grew *Staphylococcus* in per-operative cultures. Only 9.4% of cultures were positive for anaerobes in pre-operative and per-operative cultures.

Conclusion: Empirical antibiotic treatment for DFI should include *Staphylococcus* cover. Routine antibiotic cover for anaerobic organisms is not needed. Mixed skin flora in pre-operative culture does not exclude deep-seated infection.

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112. Risk factors for development of DKA in patients on SGLT2 inhibitor treatment

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Introduction: Possible increased risk of diabetic ketoacidosis (DKA) is reported on sodium glucose co-transporter 2 inhibitor (SGLT2i) therapy, with increased speculation regarding the pathophysiology of this condition. Six admissions for DKA occurred in patients on SGLT2i at Royal Bournemouth Hospital (RBH) over 12 months. We present commonalities between each case and current literature.

Method: Admissions coded for DKA and type 2 diabetes were identified and their notes reviewed to identify SGLT2i use. Retrospective review of notes was used to identify common presenting symptoms and underlying risk factors for DKA for patients on SGLT2i.

Results: In 12 months there were six admissions to RBH with DKA for patients on SGLT2i therapy, consisting of four patients, two of whom presented twice. In four admissions reduced oral intake preceded admission. All patients had a presumed diagnosis of type 2 diabetes on SGLT2i initiation and all patients were taking metformin. Subsequent investigation of one patient indicated positive anti-GAD antibodies, consistent with possible autoimmune diabetes. One patient had anti-GAD antibodies identified prior to admission. One patient was not tested for anti-GAD antibodies. One patient had type 2 diabetes which was preceded by gestational diabetes.

Conclusion: Autoimmune diabetes was associated with development of DKA in our cohort; this may have implications for recent guidance suggesting SGLT2i therapy might be used in patients with type 1 diabetes. Reduced oral intake and metformin might also be associated with DKA development. The Association of British Clinical Diabetologists' current audit on SGLT2i outcomes will assess safety in combination with metformin use.

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113. HbA_{1c} testing in patients admitted with acute coronary syndrome (ACS): an opportunity to improve glycaemic control

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(Williams HJ and Kelshiker M are joint first authors and contributed equally to this work)

Background: Current guidelines do not specifically recommend measuring HbA_{1c} in patients admitted with acute coronary syndrome (ACS). We hypothesise that measurement of HbA_{1c} would allow: (1) identification of patients with known diabetes and poor glycaemic control; and (2) increased diagnoses in patients with undiagnosed diabetes. We retrospectively audited measurement of HbA_{1c} among patients admitted with ACS.

Methods: Analysis of the electronic records of patients admitted with ACS during a 2-month period.

Results: 122 patients were admitted with ACS, mean age 69 (range 34–92), 67% male. Sixty-four (52%) had known diabetes. HbA_{1c} was measured during admission (or <3 months prior) in 30/64 patients with known diabetes. Mean HbA_{1c} was 70 mmol/mol (range 41–118). Poor glycaemic control (HbA_{1c} >64 mmol/mol) was identified in 13/30 (43%) patients. HbA_{1c} was measured in 7/58 patients without known diabetes. Mean HbA_{1c} was 41 mmol/mol (range 31–45). No new diabetes diagnoses were made. Comparing the HbA_{1c} >64 mmol/mol (n=13) and HbA_{1c} <64 mmol/mol (n=24) groups, ACS re-admission rates were not significantly different (3/13 (23%) and 2/24 (8%), respectively; p=0.32) over a mean 2.5-year follow-up. There were no in-hospital deaths. Length of stay (LoS) was significantly longer in the HbA_{1c} >64 mmol/mol group than the HbA_{1c} <64 mmol/mol group (mean difference 2.4 days, 95% CI 0.1 to 4.6; p<0.05).

Conclusion: HbA_{1c} testing identified poor glycaemic control in a large number of patients with known diabetes. No new diabetes diagnoses were made, likely due to the small number of patients tested. HbA_{1c} >64 mmol/mol identified patients with longer LoS; early interventions in this population may help reduce LoS and influence better long-term outcomes.

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114. Meeting NICE inpatient foot guidelines with no additional funding

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Background: NICE 2011 and Diabetes UK 'Putting Feet First' in 2012 recommended that patients with diabetes on admission to hospital should have a foot check, aiming to reduce hospital-acquired harm and ensure those with diabetic foot ulcers (DFU) are referred to an appropriate foot MDT in a timely manner. Pennine Acute Hospitals Trust comprises 1,486 beds across four hospital

sites. The podiatry team 6.8 WTE, manage predominantly active foot disease, with no additional resources to meet these recommendations. In 2012 we introduced a foot pathway, NaDIA and AQuA (a random sample audit) in 2017 identifying that 25% of DFU patients were not seen at all with assessments only averaging 32%.
Method: As part of the RCP Quality Improvement (QI) project, a nursing document received by all patients within 6 hours of admission, which included a vascular and neuropathic element, was identified. With permission from copyright holders we were able to customise this document to identify diabetes as a specific risk factor at the start, ensuring full completion of the assessment; an icon containing the foot pathway prompting appropriate referral was also added. Education was provided regarding the rationale for the change and appropriate completion.
Results: Screening 6 months pre July 2018 change was 37% (range 33.6–43%), post change 12 months was 91% (range 87–98%). DFU referrals also increased by 16% over the year, with 71% within the 24-hour recommendation. Hospital-acquired pressure ulcers on the foot (HAPU) were audited for patients with diabetes for the 3 months prior to the change and again after the implementation; these reduced from 56 to 24, a reduction of 57%.
Conclusion: The guidelines can be achieved at scale and be replicated across multiple hospitals with minimal additional resource. Any additional available resource can then be targeted at management of DFU. Although this contributed to the reduction in HAPU, there was also a HAPUQI project so all the improvement cannot be attributed to this alone.

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227. Current versus potential uptake of sodium-glucose cotransporter 2 inhibitors in cardiology patients with type 2 diabetes

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Background: Sodium-glucose cotransporter 2 (SGLT2) inhibitors reduce the risk of cardiovascular events in T2DM patients with or at high risk of cardiovascular disease. In practice, they are considered as second-line anti-hyperglycaemic agents following metformin.
Aim: To identify the proportion of suitable T2DM patients referred to cardiology who may benefit from SGLT2 inhibitors in a London teaching hospital.
Methods: Screening criteria for the suitability of SGLT2 inhibitors in T2DM patients were generated using three large-scale cardiovascular outcome trials: EMPA-REG, CANVAS and DECLARE-TIMI 58. Eligible patients were adults (≥18 years) with HbA_{1c} ≥48 and <108 mmol/mol, and either established cardiovascular disease or ≥2 cardiovascular risk factors. The main exclusion criterion was eGFR <30 mL/min/1.73 m^2.
Results: Over a 6-month period, 452 inpatients were referred to cardiology and 143 (32%) had T2DM. Of these, 40% (57/143) would be suitable for an SGLT2 inhibitor. This represents more than one in eight cardiology referrals. Of all suitable T2DM patients, 65% (37/57) were on metformin, 14% (8/57) on sulfonylurea, 37% (21/57) on DPP4 inhibitor, 2% (1/57) on GLP-1 receptor antagonist, 21% (12/57) on insulin and 14% (8/57) were diet-controlled only. Only 3 (5%) patients were already on SGLT2 inhibitors. None of the patients had prior unacceptable side effects to SGLT2 inhibitors.
Conclusion: Only 3% of T2DM patients who may benefit from SGLT2 inhibitors were already prescribed them. These medications have both anti-hyperglycaemic and clearly recognised cardiovascular benefits. Therefore, clear multidisciplinary care pathways need to be developed to improve communication and collaboration between endocrinologists and cardiologists to optimise SGLT2 inhibitor prescription in appropriate patients.

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228. Microbiological flora in osteomyelitis complicating diabetic foot ulceration

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Background: Diabetic foot ulceration (DFU) is associated with infection, cellulitis and osteomyelitis.
Aim: To identify the microbiological flora in patients with DFU complicated by osteomyelitis and determine the correlation between organisms and treatment outcome.
Methods: Observational study of patients with diabetes foot disease reviewed by the multidisciplinary diabetic foot team over 21 months. Data collected included baseline characteristics, wound cultures, clinical diagnosis, management and treatment outcome.
Results: Among 1,006 episodes of diabetes foot disease, 180 episodes had osteomyelitis occurring as a complication of DFU. Wound swab or tissue culture was performed in 164/180 (91%) episodes. The most common organism identified was mixed skin flora in 109/180 (66.5%) episodes. In 82/180 (50%) episodes *Staphylococcus* was identified, and *Staphylococcus aureus* (73 episodes) was the commonest species followed by *Staphylococcus* simulans (8 episodes). MRSA was identified in 14 episodes. 23/180 (12.8%) episodes revealed *Streptococcus*, with group B *Streptococcus* most common (13 episodes). In 36/180 (20%) episodes Gram-negative bacteria were identified. 13 episodes had *Corynebacterium* and 16 episodes had anaerobes. Osteomyelitis healed with medical treatment in 65.1% when mixed skin flora was identified. There was a lower incidence of successful outcome with medical treatment when *Staphylococcus* (58.5%) and *Streptococcus* (47.8%) were grown in ulceration corresponding to the osteomyelitis. There was no difference in treatment duration of osteomyelitis in the presence of Gram-positive or Gram-negative organisms (7.8 vs 7.6 weeks).
Conclusion: *Staphylococcus aureus* is the commonest organism associated with osteomyelitis complicating DFU. Identification of a Gram-positive organism is associated with a lower incidence of osteomyelitis resolution.

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243. Glycaemic disturbances after pancreas transplantation

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Background: Although diabetes mellitus after transplantation has been studied extensively, many patients develop dysglycaemia without need for insulin after pancreas transplantation. Rates are not well known, and estimates vary widely. Rates of both abnormalities have rarely been studied in the same population, and the relationship with graft failure is not generally reported.
Method: The sample population consisted of 29 patients: 19 with an abnormal glucose tolerance test (GTT) result, 8 experiencing hypoglycaemia, and 2 with both, selected from 96 patients with GTT

data. This represents 30% of pancreas transplant patients. Abnormal GTT comprises results of 'impaired glucose tolerance' and 'diabetic' levels.
Results: Hyperglycaemia (22%) was found to be twice as common as hypoglycaemia (10%). Abnormal GTT was associated with higher BMI (p=0.0165, Ab=27.6±4.0, Hy=23.7±3.7), higher C-peptide (p=0.0428, Ab=1144±610, Hyp=804±245) and a trend towards weight gain post-transplant, with the opposite being true for hypoglycaemia. An interesting finding is higher pre-transplant HbA_{1c} levels in the hypoglycaemic group (p=0.0169, Ab=65.5±19.8, Hy=89.4±20.5). The mean time to develop an abnormality was 4 years, with no significant difference between the two groups. Failure rates were 10% for the hypoglycaemic group and 5% for the abnormal GTT group compared with 12% for normoglycaemia.
Conclusions: Our main findings were: a comparison of rates of hyperglycaemia and hypoglycaemia; time to develop an abnormality; and no association with graft failure. Interesting differences include higher HbA_{1c} results in hypoglycaemic recipients, changes in weight, C-peptide and mean BMI differences. These differences may have value as predictive features when compared with normoglycaemic recipients.

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245. A further look into COVID-19 related mortality in patients with diabetes at a District General Hospital

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Introduction: The COVID-19 pandemic is a global health crisis causing significant mortality worldwide. Initial data have identified diabetes as an independent risk factor for COVID-19 related mortality. Less well understood are the characteristics of this diabetic population. Our hospital was one of the first in London to experience a high number of admissions with COVID-19 patients. We analysed COVID-19 mortality data, focusing on patients with diabetes.
Method: This was a retrospective hospital-based study. Patients with COVID-19 related mortality at Ealing hospital constituted the study sample. Patient information was obtained via electronic patient records. Data were analysed for age, gender, co-morbidities, HbA_{1c}, blood glucose on admission, microalbuminuria and diabetes medications.
Results: Our sample consisted of 93 patients, of which 43 suffered from diabetes. All patients had type 2 diabetes, there were no type 1 diabetes COVID-19 related deaths. Diabetes was the second most common co-morbidity after hypertension, constituting 46.2% of total deaths. There was no difference in gender or age distribution in the diabetic patients compared with those without diabetes. The majority (55.8%) of patients had well controlled diabetes with an HbA_{1c} of <58. Most patients (60.4%) were euglycaemic on admission.
Conclusion: Diabetes was the second most common co-morbidity in the sample. Most patients had well controlled diabetes and were not hyperglycaemic on admission. This contradicts some of the current reports published. Further studies are required looking into BMI and its relationship to COVID-related mortality.

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249. How common is diabetic ketoacidosis (DKA) in persons with type 2 diabetes? Retrospective review of aetiology and outcome of 307 consecutive DKA episodes from a tertiary centre

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Introduction: A common misconception is that DKA is associated with only type 1 diabetes. We therefore explored the proportion of patients with DKA in our centre who have type 2 diabetes. We further studied if there is a difference in the underlying aetiology and management between the two in our centre.
Methods: A retrospective study of 307 consecutive DKA episodes from 2018 to May 2020 was done. Data on demographics, precipitating factors, DKA duration and length of stay were analysed.
Results: 225 (73.3%) (male: female 0.9:1) had type 1 diabetes, 76 (24.8%) (male: female 1.2:1) had type 2 diabetes, and 6 (2.0%) had unclear pictures/data unavailable due to unavailable previous records and death. The most common precipitant for DKA in both groups was intercurrent illness (87 (38.7%) in type 1 and 32 (42.1%) in type 2). There was no significant difference in DKA duration between patients with type 1 and type 2 diabetes (median±interquartile range 14.2±9.4 hours vs 16.0±12.9 hours; p=0.4206). However, patients with type 2 diabetes had significantly longer length of hospital stay (11.3±14.4 days vs 3.2±5.3 days; p=0.0000).
Conclusion: A quarter of our DKA episodes was in patients with type 2 diabetes. Both type 1 and 2 patients had similar precipitating factors and length of DKA duration, suggesting the pathophysiology and management does not differ between the two types of diabetes. Those with type 2 diabetes needed a much longer stay in hospital, suggesting a complex need for care.

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251. Digital evaluation of ketosis and other diabetes emergencies (DEKODE) algorithm: automated auditing system for diabetic ketoacidosis (DKA) management

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Background: Regular auditing and performance feedback are key to achieving sustained improvements in DKA management. We created an automated auditing system, DEKODE, which identifies DKA episodes based on fixed rate intravenous insulin infusion (FRIII) prescription. We retrospectively validated DEKODE for its ability to audit DKA management.
Methods: Data regarding all episodes of DKA from September 2018 to August 2019 were collected. The differences between manual and automated data for DKA duration, FRIII appropriateness, glucose and ketone measurements were analysed using Prism v6.0 (Graphpad Inc) and results are presented as mean and SEM. Differences in frequencies of kalaemic complications between manual and automated data were analysed by χ^2 test.
Results: 150 episodes were identified by DEKODE. Of these, 147 had manually confirmed DKA. There was no significant difference

in DKA duration between DEKODE and manual data (16.0±1.0 hours; 17.5±0.9 hours, respectively; p=NS). There was no difference in FRIII appropriateness (98.3±1.2%; 97.9±1.1%; p=NS), glucose (98.5±2.6%; 105.6±2.5%; p=NS) and ketone measurements (43.3±2.1%; 47.1±2.2%; p=NS) between the two systems. DEKODE accurately predicted the frequency of hyperkalaemia (7/147; 6/150; p=NS) and hypokalaemia (9/147; 9/147; p=NS). However, DEKODE over-predicted the proportion of fluids prescribed (96.9±3.2%; 84.4±3.1%; p=0.0047).

Conclusion: DEKODE reliably predicts DKA duration and management, which could help reduce time from data collection to analysis, thus providing real-time performance results.

253. COVID-19 in patients with diabetes: real-world data on factors influencing outcome

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Background: Emerging data have shown associations between patients with diabetes (PwD) having excess mortality from COVID-19, but granularity is lacking.

Methods: We performed a retrospective audit comparing outcomes of COVID-19 in inpatients with and without diabetes, admitted between 31 January and 23 May 2020. Demographic data (age, sex, BMI, ethnicity and postcode), co-morbidities and outcome (ITU admission, respiratory support required, 28-day mortality) were extracted from electronic patient records. For PwD, type and duration of diabetes, HbA_{1c}, diabetes treatment, diabetes-related complications, admission glucose and ketones and episodes of hypoglycaemia (<4.0 mmol/L) or hyperglycaemia (≥12 mmol/L) were also recorded.

Results: 405 patients (≥18 years) were analysed, including 108 PwD (2 with type 1 diabetes, 2 with secondary diabetes and 104 with type 2 diabetes). Three patients were newly diagnosed during admission. No patients had diabetic ketoacidosis or hyperglycaemic hyperosmolar syndrome. Median BMI was significantly higher and Index of Multiple Deprivation scores were lower in PwD. Diabetes was associated with higher 28-day mortality and need for non-invasive ventilation but not intubation or ITU admission. HbA_{1c}, diabetes duration, admission glucose and inpatient glycaemic control did not influence ITU admission or mortality. Chronic kidney disease in PwD was associated with higher mortality (50% vs 25.8%, p=0.010). Interestingly, PwD taking metformin had significantly lower mortality (22.4% vs 45.8%, p=0.012) compared with those not on metformin.

Conclusions: Our data add insight into associations between diabetes and COVID-19. Although sample size was limited, optimising weight and renal function as well as considering metformin in PwD could potentially be helpful in mitigating COVID-19 related mortality.

256. The ABCD Nationwide Semaglutide Audit: initial insights from real-world data

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Background: The ABCD Nationwide Semaglutide Audit launched in January 2019 with the aim of establishing whether randomised controlled trial data on semaglutide use translated into a real-world cohort where patient characteristics may be different, less idealised, than in a trial setting. We noted that, in the initial clinical trials with semaglutide, the mean weight of the patients was about 93 kg and mean HbA_{1c} was about 66 mmol/mol (8.2%).

Methods: Data submitted to the national audit from CCG and secondary care sources were analysed in Stata 16. A planned sub-analysis of those switched from any other glucagon-like peptide receptor-1 agonist (GLP1-RA) was performed.

Results: 1,104 patient data sets were included with a mean±SD age 58.9±11.0 years, weight 107.5±23.5 kg, BMI 37.2±7.3 kg/m^2, HbA_{1c} 75.2±18.3 mmol/mol (9.4±1.8%). The median duration of diabetes was 11.0 years (IQR 6–15) and 52.8% were male. The median follow-up period was 0.36 years (IQR 0.23–0.57). In this cohort, mean changes in HbA_{1c} of –10.1 mmol/mol (95% CI –8.6 to –11.7) or –0.96% (95% CI –0.81% to –1.1%; p<0.0001), weight of –3.8 kg (95% CI –3.2 to –4.4; p<0.0001) and BMI –1.39 kg/m^2 (95% CI –1.2 to –1.6; p<0.0001) were noted from baseline across the population as a whole. 23.8% of the population (262/1104) were switched from an alternative GLP1 agonist with additional changes in HbA_{1c} (–7.8 mmol/mol; 95% CI –5.4 to –10.3; p<0.0001; –0.73%, 95% CI –0.5% to –0.96%) and weight (–1.9 kg; 95% CI –0.9 to –2.9; p=0.0003) noted from the time of switch.

Conclusions: In this early analysis from the ABCD Nationwide Semaglutide Audit, our results suggest that the patients receiving semaglutide in real clinical practice are heavier and more poorly controlled than in the clinical trials. Considerable reductions in weight and HbA_{1c}, comparable with those found in the clinical trials, were found. Initial subgroup analysis of those previously taking GLP1-RA demonstrated an association between switching to semaglutide and significant additional reductions in HbA_{1c} and weight.

258. Rapid implementation of a Virtual Inpatient Diabetes Service (VIDS) during the COVID-19 pandemic

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Background: In response to the COVID-19 pandemic, UHL rapidly implemented a daily (Monday–Friday) VIDS running from 23/03/20 to 03/08/20. All inpatients with diabetes (including COVID-19 positive) were reviewed virtually. During the pandemic, the numbers of inpatients with diabetes fell from on average >300 (pre-pandemic) to approximately 200 each day. The peak of UHL inpatients with COVID-19 (April 2020) was 204 patients.

Aims: The aims of the study were as follows: (1) to review all patients with diabetes ±COVID-19; (2) to minimise exposure of staff

to COVID-19; (3) to preserve PPE for frontline staff; and (4) evidence safe levels of care.
Results: All patients: % CBG <2.9 mmol/L was 0.7, 0.9 and 0.9; 4–12 mmol/L was 75.0, 76.5 and 76.0; >25.0 mmol/L was 0.9, 0.8 and 0.8 pre, during and post VIDs. Patients with CFS 5 or above: % CBG <2.9 mmol/L was 0.8, 0.8 and 0.7; 4–15 mmol/L (range extended for older frail inpatients) was 84.8, 87.5 and 85.6; >25.0 mmol/L was 1.2, 0.7 and 0.8 pre, during and post VIDs. NaDIA harms: no rise in hypo harms during VIDs. Two cases of in-hospital DKA were identified by VIDS team (3 DKA harms reported), one case: COVID-19 positive taking SGLT2i.
Discussion: Introduction of a VIDS did not lead to detrimental outcomes in terms of in-hospital harms. A small increase in % CBG <2.9 mmol/L for all patients was not associated with a rise in NaDIA hypo harms. If we need to reinstate a VIDS during a second COVID-19 wave, we can be reassured re safety and should focus on minimising risk of hypoglycaemia, appropriate targets for individual patients (eg, older/frail/EoL patients) and risk of DKA with COVID-19/SGLT2i and national guidance for management of inpatients with diabetes and COVID-19.

260. Can HbA_{1c} levels be used as an independent marker of mortality and morbidity risk in patients with COVID-19 positive swabs?

Zafar M, Randhawa RS, Hegner J, Alam S, Farooq M, Eldebri R, Barry L, Pun B, Shahbaz M, Makanjuola OA, Cuison F, Safarova D, Lawrence K, Elyasaky A, Nooredinvand HA, Periasamy M, Khanna A, Subba K, Adekunle BA, Ojofeitimi O, Esteves Morete A, Ciroi TMG, Karkhanis M, Khuu B, Maryam Z, Patel M, Zafar MJ, Zafar N, Rehman UU, Moran S, O'Neill W, Taylor N, Golez R, Hadid A, Muhammad T, Dashora U
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Background: Diabetes mellitus has been considered a significant risk factor for morbidity and mortality for COVID-19.[1] HbA_{1c} levels are often used as a marker of poor glycaemic control and are one way of diagnosing pre-diabetes as well as diabetes.[2,3] We tried to explore whether HbA_{1c} levels could be an independent risk factor for mortality and morbidity in patients with positive coronavirus (SARS-COv-2) swabs.
Methods: This was a retrospective multicentre study of coronavirus swab positive patients who had a recent HbA_{1c} test. Their demographic data, medical history, COVID-19 swab and laboratory results, and final outcomes were analysed. Patients were divided into three groups; HbA_{1c} in normal (group 1), pre-diabetic (group 2) and diabetic (group 3) ranges. Data were analysed using JASP and statistical computation using a χ^2 test.
Results: A total of 1,226 patients had SARS-CoV-2 RNA identification swabs between 10 February 2020 and 1 May 2020. A cohort of 120 of these patients had positive swab results and recent HbA_{1c} results. Mortality rates for group 1 (normal HbA_{1c}) and 3 (diabetic HbA_{1c}) were relatively higher than group 2 (pre-diabetic HbA_{1c}). Among group 2, female patients had greater mortality, perhaps because of fewer male patients, although overall co-morbidity was less (4/120 (3.33%) in group 2 compared with 18/120 (15%) in group 1 and 14/120 (11.66%) in group 3. Overall, 36/120 (30%) patients died and 84/120 (70%) survived. Survival curves after analysis of data showed that increasing HbA_{1c} levels were associated with poorer outcomes across all groups. Analysis was significant with p=0.003.
Conclusions: HbA_{1c} levels in this study were an independent marker of increased risk of mortality in COVID-19 swab positive patients. The findings are statistically significant (p=0.003). Increased co-morbidities at normal HbA_{1c} seem to have a contributing role in enhanced mortality.

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267. Review of management of hyperosmolar hyperglycaemic state in acute hospital admissions

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Background: Hyperosmolar hyperglycaemic state (HHS) is a medical emergency, usually affecting older people, with high associated mortality. Diagnosis should be prompt and treatment intensive, whilst adjusting management for complex multi-morbid patients.
Aim: To review the diagnosis and management of HHS.
Methods: A retrospective analysis was undertaken (electronic and paper records) using Joint British Diabetes Societies guidelines (2012) for audit standards.
Results: 30 patients from emergency department coding were selected; 13 had an alternative diagnosis. The cohort (n=17) was predominantly older females with known diabetes with a high co-morbidity burden. Diagnosis made at 2.07 hours from arrival, osmolality calculated in 88% at diagnosis but not repeated. The majority of patients (77%) had HbA_{1c} pre-admission (mean 8.7%, mean 94 days prior) and 24% had HbA_{1c} checked on admission. HHS management proforma commenced in 12/17, continued for 5 patients but with significant omissions. Reasons for intravenous insulin varied, 31% used prematurely. 77% were managed on a monitored unit, but only 47% directly from ED, with death of 35% within 6 months of admission.
Conclusion: Early recognition and diagnosis of HHS with rigorous adherence to protocol are key in minimising morbidity and mortality. This audit showed that initial management was satisfactory; however, ongoing adherence to the protocol was poor as was prognosis for this group of patients. Action is required to raise awareness of HHS diagnostic criteria and the importance of ongoing active management. Technology could be used to prompt calculation of osmolality in hyperglycaemic admissions and at intervals if HHS is confirmed; there should be a robust follow-up pathway at discharge.