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**Objective:** To explore the relationship between diabetes mellitus (DM), hyperglycemia, and adverse outcomes in critically ill patients with coronavirus disease 2019 (COVID-19).

**Research Design and Methods:** The study population comprised 133 patients with COVID-19 admitted to an intensive care unit (ICU) at an academic, urban, quaternary-care center between March 10<sup>th</sup> and April 8<sup>th</sup>, 2020. Patients were categorized based on the presence of DM and early-onset hyperglycemia (EHG), defined as a blood glucose >180 mg/dL during the first two days of ICU admission. The primary outcome was 14-day in-hospital mortality; also examined were 60-day in-hospital mortality and the levels of C-reactive protein (CRP), interleukin 6, procalcitonin, and lactate. **Results:** Compared to non-DM patients without EHG, non-DM patients with EHG exhibited higher adjusted hazard ratios (HR) for in-hospital mortality at 14 days (HR 5.76,  $p=0.008$ ) and 60 days (HR 7.28,  $p=0.004$ ). Non-DM patients with EHG also featured higher levels of mean CRP ( $322.3\pm 177.7$  mg/L,  $p=0.036$ ), procalcitonin ( $34.75\pm 69.33$  ng/mL,  $p=0.028$ ), and lactate ( $2.7\pm 2.1$  mmol/L,  $p=0.023$ ). **Conclusions:** In patients with critical illness from COVID-19, those without DM with EHG were at greatest risk of 14-day and 60-day in-hospital mortality. The limitations of our study include its retrospective design, and relatively small cohort. However, our results raise the possibility that the combination of elevated glucose and lactate may identify a specific cohort of individuals at high mortality risk from COVID-19, and suggest that glucose testing and control are important in individuals with COVID-19, even in those without pre-existing diabetes.

## Diabetes Mellitus and Glucose Metabolism

### COVID-19 AND DIABETES

#### *Impact of COVID 19 National Lockdown on Glycaemic Control in Children and Adolescents With Type 1 Diabetes (T1DM): A Retrospective Review at a Large UK Teaching Hospital*

Neil Richard Lawrence, MbChB, MRCPCH<sup>1</sup>, Anuja Natarajan, MBBS, MRCP, MRCPCH<sup>2</sup>, Razia Petkar, MBBS, MRCPCH<sup>2</sup>, Lovlin Joseph, MBBS, MRCPCH<sup>2</sup>.

<sup>1</sup>SHEFFIELD CHILDREN'S HOSPITAL, Sheffield, United Kingdom, <sup>2</sup>Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust, Doncaster, United Kingdom.

**Introduction:** The coronavirus disease global pandemic led to national lockdown in the United Kingdom on 23<sup>rd</sup> March 2020. We compared the glycaemic control of children and adolescents with Type 1 diabetes (T1DM) at Doncaster & Bassetlaw Teaching Hospitals in the 12 weeks prior to the lockdown, to the 12 weeks following lockdown. **Methods:** HbA1c result 3 months following lockdown was compared to the last HbA1C prior to lockdown. Data from Continuous Glucose Monitors (CGMs), Flash Glucose Systems (FGS) and those performing Self-Monitoring of Blood Glucose (SMBG) were compared alongside changes to patient contact that occurred. **Results:** In 264 patients under 20 years of age across both hospitals in the Trust, face-to-face consultations decreased (245 vs 151, 39%), and

remote consultations increased (1751 vs 2269, 30%) ( $\chi^2$   $p<0.001$ ). Excluding those within a year of diagnosis, 122 had paired HbA1c results, and 80 had more than 70% of glucose monitoring data available. HbA1c levels decreased (67.4 mmol/mol vs 61.3 mmol/mol,  $p<0.001$ ) and glucose monitoring data showed lower mean glucose after lockdown (9.7mmol/L vs 9.5mmol/L,  $p=0.034$ ) with lower standard deviation (4.4mmol/L vs 4.2mmol/L,  $p<0.001$ ). Proportion of time in range (3.9mmol/L to 10mmol/L) increased ( $n=47$ , 55.2% vs 58.0%,  $p=0.017$ ), with no change to time below range (4.8% vs 5.0%,  $p=0.495$ ). **Conclusion:** Glycaemic control improved in the 12 weeks following national lockdown. This demonstrates the difficulties faced by patients and carers managing T1DM around school pressures, meals away from home, social life and peer pressure. Increased remote contact with patients with T1DM has not been detrimental to glycaemic control.

## Diabetes Mellitus and Glucose Metabolism

### COVID-19 AND DIABETES

#### *Impact of Covid-19 Lockdown Measures on Lifestyle Behavior in Children and Adolescents With Severe Obesity*

Ozair Abawi, MD<sup>1</sup>, Mila Sofie Welling, MD<sup>1</sup>, Emma van den Eynde, MSc<sup>1</sup>, Elisabeth F.C. van Rossum, MD, PhD<sup>2</sup>, Jutka Halberstadt, MSc, PhD<sup>3</sup>, Erica L T van den Akker, MD, PhD<sup>1</sup>, Bibian van der Voorn, MD, PhD<sup>1</sup>.

<sup>1</sup>Erasmus MC-Sophia Children's Hospital, Rotterdam, Netherlands, <sup>2</sup>Erasmus Medical Center, Dept of Internal Medicine, Rotterdam, Netherlands, <sup>3</sup>Vrije Universiteit Amsterdam, Amsterdam, The Netherlands, Rotterdam, Netherlands.

**Introduction:** During the COVID-19 pandemic, lockdown measures were implemented with large impact on lifestyle behaviors and well-being of children (including adolescents). The impact on children with severe obesity, who plausibly are at even larger risk, has not yet been described. Aim of this study was to investigate the impact of COVID-19 lockdown on eating behaviors, physical activity, screen time and quality of life (QoL) of children with severe obesity. **Methods:** In this mixed-methods study, questionnaires and semi-structured telephone interviews were used to investigate impact of COVID-19 during the first wave in the Netherlands (April 2020) on children with severe obesity (adult BMI-equivalent  $\geq 35\text{kg/m}^2$ ) treated at our obesity center. The Dutch Eating Behavior Questionnaire - Child, Pediatric Quality of Life Inventory, and Dutch Physical Activity Questionnaire were filled out by their families pre-pandemic and during lockdown. Changes over time in percentile scores, weekly physical activity and screen time were assessed. Qualitative analyses were performed according to the Grounded Theory. **Results:** We included 83 families, of which 75 participated in the interviews. Their children's characteristics were mean age 11.5 years (SD 4.6), 52% female, mean BMI SD score 3.8 (SD 1.0), indicating severe obesity. On group level, no changes in scores for emotional, restrained, external eating, and QoL nor in screen time were observed ( $\Delta$  scores +9.2, +3.9, +0.3; and +3.0, respectively; -0.3 hr/wk; all  $p>0.05$ ). Weekly