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P148 -Insulin Use For The Treatment Of Acute Hyperkalaemia

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Background
Insulin has been the cornerstone of acute treatment for hyperkalaemia for many decades and remains in wide clinical use. Despite this, there is a paucity of data on the efficacy and safety of this approach, with reports of serious complications including hypoglycaemia. To investigate this, we interrogated a large electronic health record (EHR) dataset to explore the characteristics and consequences of insulin treatment for hyperkalaemia.

Methods:
Patients receiving insulin for the treatment of hyperkalaemia were identified from a complete EHR database of all emergency admissions to Addenbrooke's Hospital, Cambridge, between April 2015 and August 2018. Variables extracted included demographics, comorbidities, concomitant medications, biochemistry results including all blood potassium values, and all in-hospital prescribing, admission and discharge dates. Comorbidity was assessed using a modified Charlson comorbidity index. Data were summarised as frequency (%), mean□ standard deviation (SD) or median with interquartile range (IQR) as appropriate. Factors associated with the need for insulin retreatment were explored using mixed-effects logistic regression and odds ratios are reported.

Results:
Insulin was administered to 1,284 adult patients (2,541 total administrations). Insulin-treated patients were aged 72 (IQR 59.5-84.5) years and had significant comorbidity (Charlson index 5, IQR 3 to 7). At the end of the follow-up period, only 60.3% remained alive.
Potassium concentration immediately (≤ 60 min) pre-treatment was 6.34□1.2 mmol/L. The mean reduction in potassium at 4-hours post treatment was 0.86□0.92 mmol/L. Median time from admission to recorded hyperkalaemia that was treated with insulin was 13 (3.1-79.5) hours. Multiple doses were required in 542 patients (42.2%), of which 209 (16.2%) were retreated within 4 hours of the first treatment. Patients receiving multiple insulin treatments were more likely to have CKD (44.5% vs 36.5, p=0.002) or heart failure (22.9% vs 17.4%, p=0.009) and to have been exposed to ACE inhibitors (33.2% vs 27.9%, p=0.02) or potassium sparing diuretics (19.4% vs 15.5%, p=0.04), although only CKD remained significantly associated with retreatment in a regression model adjusted for age, gender and co-morbidity (OR 1.4, 1.1-1.7, p=0.01). Dysregulation of glucose metabolism occurred in 672 patients (53%) following insulin. Hypoglycaemia (plasma glucose < 4 mmol/L) occurred in 133 patients (10.4%) within 4 hours of insulin administration, and 16 patients (1.2%) experienced a glucose < 2 mmol/L. Hyperglycaemia (plasma glucose >10mmol/L) occurred in 523 (40.7%) of insulin-treated patients. Median length of stay for insulin treated patients was 11.7 (4.9-24.7) days.

Conclusion:
Hyperkalaemia requiring insulin treatment occurs most commonly in a more elderly and comorbid population, is associated with CKD, requires re-treatment in 4 out of 10 patients, and is associated with dysregulated glucose metabolism (either high or low) in 53%. There is an unmet need for improved emergency treatments for hyperkalaemia.