Severe Sustained Hyperglycemia in Setting of Simultaneous Dobutamine and Insulin Infusions - Drug Interaction

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Case: A 55 year old female with a history of congestive heart failure, type 1 diabetes mellitus and chronic kidney disease stage IV presented to the ED for acute on chronic progressive shortness of breath. She was admitted to the telemetry unit and treatment with diuretics was initiated. During the course of hospitalization, she was noted to have atrial fibrillation with rapid ventricular response and dro-nedarone was started. However, her heart rate remained elevated along with borderline hypotension and thus, she was transferred to the ICU for amiodarone infusion and continued diuresis with dobutamine support via central line. Since the day of admission, she was being managed on a subcutaneous insulin regimen; however, while in the ICU her blood glucose levels continued to rise and remained elevated at 400-500 mg/dL (normal range 70 - 99 mg/dL). As per Endocrinology, insulin drip was started. The patient had poor peripheral vasculature and it was difficult to obtain and maintain peripheral intravenous (IV) access. Therefore, the same right internal jugular central line was used to infuse both dobutamine and insulin. The insulin drip was continued on and off for just short of 3 days and with an average rate of >10 units insulin per hour, and the highest rate of insulin infusion running at 15 units/hour for more than 7 hours. Her insulin requirement declined as dobutamine was weaned off, and ultimately, she was transitioned back to a basal-bolus regimen.

Discussion: Hyperglycemia is a common occurrence in critically ill patients for which insulin drip is a powerful tool. There is paucity of data on insulin and its incompatibility with vasopressors, another class of very commonly used agents in the intensive care unit (ICU) setting. Research has shown that vasopressors can cause insulin resistance if infused via the same vascular channel by rendering insulin ineffective. A previously published case report detailed a patient requiring Insulin infusion as high as 450 units/hr while norepinephrine and insulin were being administered via the same central line and upon switching them to different IV access sites, the insulin requirement decreased to 14 units/hour. Another study demonstrated reduction in insulin efficacy by 70% in patients receiving simultaneous norepinephrine. There are no such studies available on interactions of insulin with dobutamine. This case report calls attention to the risk of deleterious interactions between commonly used medications in the ICU setting running through the same channel. This is an important entity to recognize as standard treatment protocols for IV insulin treatments do not typically account for other simultaneous IV medications which can have profound consequences in regards to dosing and wide range of variation from hyperglycemia to hypoglycemia if the titration based on medication interaction is not accounted for.