

Enhanced optimal insulin regulation in post-operative diabetic patients: an adaptive cascade control compensation based approach with diabetic and hypertension

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Abstract— In this study, a cascade control strategy is adapted to control the glycaemic level for post-operative patients in the presence of hypertension. The perioperative strain and sudden pressure distinction may lead to hyperglycemia and osmotic diuresis along with Hyperinsulinemia. Also, the recent medical diagnostics show that diabetes and blood pressure occur together and these two have substantial overlap in its disease mechanism, also there is a need to monitor both the parameters simultaneously and control the glucose level in an optimal manner. The overall control (cascade) control strategy can be considered with two different types of loops, an inner loop which provides the amount of disturbance created by hypertension and regulates the variance of insulin level in shots of variation. The advisory control algorithms incorporate the cascade methodology along with expert knowledge to treat this disease by using Fuzzy logic controllers (Mamdani-type) to regulate the proper insulin infusion. The outer loop aims to manage the inner loop parameter variation and control the optimal infusion to the patients. The extensive cascade simulations are demonstrated and the projected control scenario provides a better outcome and possibly attain better glycaemic control for diabetic cum hypersensitive patients.

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