Impact of clevidipine versus nicardipine on time in range when lowering blood pressure (CTRL-BP)

Background: Within emergency and critical care medicine, there are a variety of emergent conditions that present with dangerously elevated blood pressures and require rapid blood pressure control. Two intravenous medications commonly used first-line for rapid blood pressure control are nicardipine and clevidipine, both of which are available as titratable drips. The major difference between them is their pharmacokinetic profiles, which could impact how quickly and precisely blood pressure control can be attained. The objective of this study was to evaluate efficacy and safety outcomes associated with current use of these medications in a hospital system in order to provide insight into whether one agent should be favored in practice.

Methods: This study was a multi-center, retrospective chart review conducted within a hospital-system. Inclusion criteria encompassed patients between the ages of 18 and 89 treated at an acute care hospital with nicardipine or clevidipine for emergent blood pressure control between June 1, 2020 and June 30, 2021. Patients were matched in a one-to-one fashion based on indication for blood pressure control and similar pre-intervention systolic blood pressure (SBP). The exclusion criteria included patients who were pregnant or experiencing eclampsia post-partum, were transferred between facilities within 24 hours of infusion initiation, were transferred to an external acute care facility prior to discharge, were discharge or deceased within 24 hours of drip initiation, or otherwise eligible patients who did not have a match. The primary outcome was percent of time within target SBP range. The secondary outcomes were time to target SBP, incidence of hypotension during infusion, and use of rescue medication during infusion. This study was approved by the local institutional review board.

Results: Altogether, 569 patients were screened which resulted in 100 matched pairs. The majority of pairs had an intracranial hemorrhage (42%), followed by hypertensive emergency (22%), or acute ischemic stroke (16%). The mean pre-intervention SBP, mean SBP goal, and ranges were similar between groups. There was no significant difference in how patients were distributed among the hospitals but there was a difference between agent received and setting of care; more patients in the clevidipine group were treated in the emergency department (ED), whereas more patients in the nicardipine group were treated in the intensive care unit (ICU). The percent of time in SBP range was similar between nicardipine and clevidipine when stratified by location of care (51.5% vs 51.7%, p=0.970 for ED; 68.1% vs 68.8%, p=0.913 for ICU). The time to target SBP range was faster with clevidipine than nicardipine, overall (20 min vs 34 min, p=0.013). There were higher rates of hypotension with nicardipine (17% vs 10%, p=0.093) and more rescue medications required with clevidipine (33% vs 29%, p=0.541), however neither of these endpoints reached statistical significance.

Conclusions: This is the first study showing a statistically significant difference in time to target blood pressure range with clevidipine compared to nicardipine. Although there was no difference in the time in blood pressure range between the two agents, nicardipine was associated with a non-significant increase in the incidence of hypotension. This study included patients with a wider range of indications than previously studied. These findings suggest that clevidipine should be favored for rapid blood pressure due to increased efficacy and comparable safety.