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Lacosamide dosing in patients receiving continuous renal replacement therapy

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Abstract

Background Lacosamide is one of the anticonvulsants used in critically ill patients. This study aimed to suggest appropriate lacosamide dosing regimens in critically ill patients receiving continuous renal replacement therapy (CRRT) via Monte Carlo simulations.

Methods Mathematical models were created using published demographic and pharmacokinetics in adult critically ill patients. CRRT modalities with different effluent rates were added into the models. Lacosamide regimens were evaluated on the probability of target attainment (PTA) using pharmacodynamic targets of trough concentrations and area under the curve within a range of 5–10 mg/L and 80.25–143 and 143–231 mg*h/L for the initial 72 h-therapy, respectively. Optimal regimens were defined from regimens that yielded the highest PTA. Each dosing regimen was tested in a group of different 10,000 virtual patients.

Results Our results revealed the optimal lacosamide dosing regimen of 300–450 mg/day is recommended for adult patients receiving both CRRT modalities with 20–25 effluent rates. The dose of 600 mg/day was suggested in higher effluent rate of 35 mL/kg/h. Moreover, a patient with body weight > 100 kg was less likely to attain the targets.

Conclusions Volume of distribution, total clearance, CRRT clearance and body weight were significantly contributed to lacosamide dosing. Clinical validation of the finding is strongly indicated.

Keywords Lacosamide, Pharmacokinetics, Drug dosing, Critically ill patients, Continuous renal replacement therapy

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