Abstract

A closed-loop dosing system integrates a "TraceLoop" control engine with ICD-10-coded diagnosis overlays. Each diagnosis provides a control-layer modifier beyond basic risk scoring – adjusting dose ceilings, imposing gating conditions, enabling inter-therapy synergies, or enforcing exclusions. An overlay compilation algorithm merges multiple simultaneous diagnoses via a conflict-resolution graph that balances competing rules. This ensures dynamic, individualized medication dosing adjustments in real time that account for the patient's entire diagnostic profile. Example implementations include insulin infusion automatically gated by serum potassium in diabetic ketoacidosis, sodium correction rates capped in hyponatremia, and vasopressor targets lowered for intracerebral hemorrhage patients. The disclosed schema maps standard ICD-10 codes to modular control parameters, which can be combined in any permutation via defined merge logic. This approach extends the closed-loop dosing paradigm to incorporate complex co-morbid conditions, broadening therapeutic safety and personalization across a wide range of clinical scenarios under a unified framework.