To determine the serum concentration of vancomycin achieved with doses used in current practice in patients undergoing intermittent hemodialysis

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Background:
Vancomycin is administered as first-line empirical treatment in patients on intermittent hemodialysis every 96 hours. In patients with compromised renal function, there can be accumulation of the antibiotic, leading to elevated serum vancomycin concentrations in the inter-dosing period. On the other hand, serum vancomycin concentrations can diffuse through the dialyser membrane and concentrations may fall below the therapeutic range (10-20 mg/L). There are no clear guidelines about the timing and frequency of trough-level monitoring in patients on hemodialysis, especially on those with low-flux dialyzers. The aim of this study was to measure the serum vancomycin concentration achieved with standard doses in patients undergoing intermittent hemodialysis, on different defined days, after initiation of therapy.

Methodology:
This was an open label, prospective cohort, descriptive observational study. 40 patients on hemodialysis, started vancomycin at the discretion of treating clinician, were recruited after obtaining an informed written consent. Vancomycin 1000 mg IV was administered within one to two hours after completion of dialysis. First blood sample for serum vancomycin concentration measurement was collected 24-30 hours after first vancomycin dose. Subsequent samples were collected at 48-72 hours and 72-96 hours after first dose. An additional blood sample was collected if an intervening dialysis session was scheduled. Serum was separated and analysed using high performance liquid chromatography (UV-HPLC).

Results:
Only 19% of patients in this study were in the recommended therapeutic range of 10-20 mg/L throughout the four-day treatment duration. 9% of patients had their serum vancomycin concentrations consistently below lower limit of recommended therapeutic range (<10 mg/L). Also, 35% of patients had at least one serum vancomycin concentration below < 10 mg/L throughout the 96 hours. The proportion of patients below therapeutic range increased four times (12 patients) at the end of 96 hours when compared to their initial- 48 hours (3 patients) serum vancomycin concentrations.

Conclusion:
This study showed that only one-fifth of the patients were in therapeutic range through the inter-dosing duration. This demonstrates the need for dose optimization by therapeutic drug monitoring within 48 hours of vancomycin therapy in hemodialysis patients.

Keywords: Vancomycin, Hemodialysis, Therapeutic Drug Monitoring, HPLC