Subject: Vancomycin Dosing and Monitoring Protocol

Purpose: To provide a precise and accurate method of initiating and monitoring vancomycin therapy in order to insure optimal drug therapy for the patient.

Policy: Background
Vancomycin is a narrow-spectrum glycopeptides antibiotic with potent antistaphylococcal activities. It has been in use since the late 1950s, however, with the addition of the antistaphylococcal penicillins and later cephalosporins in addition to reports of both ototoxicity and nephrotoxicity, the use of vancomycin was limited. Recently because of the increasing prevalence of infections caused by methicillin-resistant strains of Staphylococcus aureus (MRSA), its use has increased dramatically.1

A number of studies conducted within the last decade have given new insight into the potential for both ototoxicity an nephrotoxicity associated with vancomycin use. Many of these reports failed to show nephrotoxicity in patients treated with vancomycin alone.1 The majority of the reports describing the nephrotoxicity of vancomycin were reported in the early 1960s and are now thought to be due to impurities in the original vancomycin preparation.2 Recently however, studies have found that the combination of an aminoglycoside with vancomycin provides additive risk of developing nephrotoxicity over monotherapy with either vancomycin or an aminoglycoside.3,4,5

The potential of vancomycin to cause ototoxicity was recently addressed in a review by Brummett and Fox.6 They reviewed all reports of ototoxicity associated with vancomycin use from 1958-1989. Based on this review the authors found limited data associating vancomycin use and the development of ototoxicity. Based on their review, the authors concluded it is possible that vancomycin is only ototoxic when used with other ototoxic agents, such as aminoglycosides.6

Additional Information:
1.0 Selection of Patients:
1.1 A physician may request the Pharmacy Department to initiate and/or adjust vancomycin therapy for a given patient. The physician should:
   1.1.1 Initiate therapy with a loading dose or if desired, have Pharmacy Department initiate therapy.
   1.1.2 Request a Pharmacy Department consult by means of a chart order (written or verbal).
The following “high-risk” patients are recommended for evaluation by the Pharmacy Department. If no consult has been requested, informal consultation will be made if the drug order varies significantly from the calculated value.

2.1 Patients in the intensive care units.
2.2 Patients with elevated serum creatinine or estimated creatinine clearance less than 50 ml/min.
2.3 Neutropenic patients.
2.4 Patients receiving other potentially nephrotoxic or ototoxic agents concomitantly. (i.e. Aminoglycosides, Amphotericin B, Erythromycin, Furosemide)
2.5 Patients with reported vancomycin trough concentrations greater than 20 mg/l.

3.0 Pharmacist’s Activity:
3.1 The pharmacist will review the chart and pertinent medical history and document his/her findings and course of action on the pharmacy consult sheet.
3.2 If not presently available on the patient’s chart, the following laboratory studies will be ordered initially and as needed to follow therapy.
   3.2.1 Chem lytes (to include serum creatinine and BUN)
   3.2.2 CBC with differential
   3.2.3 Appropriate cultures and sensitivity
   3.2.4 Vancomycin level(s) as required

4.0 The pharmacist will determine an appropriate regimen to maintain peak concentrations with 25-40 mg/l (unless otherwise specified by the physician) and trough concentrations between 10-20 mg/l.
4.1 The above serum levels are to be used only as a guide when establishing a dosage regimen. Clinical judgment and individual patient parameters may dictate alternative levels to be used.

5.0 Vancomycin Levels:
5.1 Indication for drawing vancomycin level(s) (Initial set of levels are not required in all patients.)
   5.1.1 Patients who are elderly, who have diminished renal function, or are receiving other potentially nephrotoxic or ototoxic agents concomitantly.
   5.1.2 Patients who do not appear to respond to therapy.
   5.1.3 Patients receiving vancomycin therapy for greater than or equal to 10 days.
   5.1.4 In clinically stable patients who continue therapy after 10 days, levels will be drawn every 7 to 10 days to insure that the patient is not accumulating the drug.

6.0 Timing of Vancomycin Levels:
6.1 Trough levels – less than or equal to 1 hour prior to next dose.
6.2 Peak levels – 15 minutes after the end of infusion (peak level is not necessary).
6.3 A single trough level drawn as described above is all that is necessary in order to establish efficacy and the potential for toxicity.

7.0 Initial doses and dose adjustments are to be calculated:
7.1 Using the Datakinetics dosing software.
7.2 Alternatively as follows:
   7.2.1 15-20 mg/kg actual body weight every 8-12 hours for patients with normal renal function will be necessary to reach suggested trough levels. To reach target levels rapidly a loading dose of 25-30 mg/kg may be considered.
   7.2.2. 15-20 mg/kg actual body weight
   Every 8-12 hrs if CrCI > 50 ml/min
   Every 24 hrs if CrCI – 20-49 ml/min
   Serum concentration if CrCI - < 20 ml/min

References: