I. PURPOSE:

To allow standardized pharmacist management of IV vancomycin in the inpatient setting using evidence-based guidelines and best practices.

II. POLICY:

A. Upon provider request, Stanford Health Care (SHC) pharmacists will manage IV vancomycin therapy in accordance with evidence-based guidelines and best practice standards.
   1. Adjust vancomycin orders
   2. Order pertinent labs (e.g. vancomycin levels, serum creatinine (SCr))
   3. Provide documentation via progress notes and Epic flowsheet

B. Protocol exclusions:
   1. One-time dose
   2. Anticipated duration < 2-3 days (e.g. surgical/peri-operative prophylaxis)
   3. Pediatric patients (<18 years of age)

III. PROCEDURE:

A. Physician/Ordering Provider Responsibility
   1. Indicate that a patient is to receive vancomycin according to this protocol by entering an order for “Vancomycin per Protocol” and specifying the following:
      a. Initial indication: Prophylaxis, treatment, empiric, definitive
      b. Suspected infection type/source
      c. Anticipated duration of therapy
   2. Continue to follow vancomycin levels and consult with pharmacist as needed
   3. Notify the pharmacist of acute changes in patient’s status that may impact vancomycin dosing (e.g. changes in renal function, urine output)
   4. Ordering providers may discontinue and/or reinitiate the protocol at any time
      a. If the protocol is discontinued, the provider assumes responsibility for vancomycin therapy management
   5. Notify the pharmacist of acute changes in patient’s status that may impact vancomycin dosing (e.g. changes in renal function or urine output)

B. Pharmacist Responsibility
   1. Upon receipt of a “Vancomycin per Protocol” order, review the patient’s chart to ensure the appropriate use of vancomycin
      a. Clarify indication if not provided and/or not clear in medical chart
      b. Recommend alternative therapy if vancomycin use is inappropriate or contraindicated

2. Determine pharmacodynamic target based on indication [Refer to SHC Vancomycin Dosing Guide- Section B]
3. Obtain relevant parameters for appropriate dosing [Refer to SHC Vancomycin Dosing Guide- Section A]
4. Determine vancomycin dosing to achieve pharmacodynamic target [Refer to SHC Vancomycin Dosing Guide]
5. Enter necessary lab and medication orders for vancomycin therapy
   a. Sign all orders as "Per Protocol without co-sign"
   b. Check SCr at baseline and as needed (at least every 3 days). Correlate vancomycin levels with SCr trends and monitor changes in renal function
   c. For difficult sticks, refer to Nursing policy "Antibiotic Pre and Post Levels"
6. Documentation
   a. Fill out pharmacy flowsheet as needed for handoff updates and AUC results
   b. Enter a daily Pharmacy Progress Note using the Pharmacy Monitoring note template ("vancomycin")
7. Monitoring
   a. Review daily to determine continued indication, dose adjustment, and/or additional labs based on new clinical information

IV. DOSING & MONITORING GUIDELINES

A. Pharmacist will follow the SHC Vancomycin Dosing Guide in conjunction with clinical discretion to optimize dosing and minimize toxicity

V. COMPLIANCE:

A. All workforce members including employees, contracted staff, students, volunteers, credentialed medical staff, and individuals representing or engaging in the practice at SHC are responsible for ensuring that individuals comply with this policy.
B. Violations of this policy will be reported to the Department Manager and any other appropriate Department as determined by the Department Manager or in accordance with SHC policy. Violations will be investigated to determine the nature, extent, and potential risk to SHC. Workforce members who violate this policy will be subject to the appropriate disciplinary action up to and including termination.

VI. RELATED DOCUMENTS / PROCEDURES:

A. Vancomycin Dosing Guide
B. Vancomycin AUC Excel calculator

VII. DOCUMENT INFORMATION:

A. Legal References / Regulatory Requirements:

1. Rybak M, et al. Therapeutic monitoring of vancomycin for serious methicillin-resistant Staphylococcus aureus infections: A revised consensus guideline and review by the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Pediatric Infectious Diseases Society, and the Society of Infectious Diseases Pharmacists; Am J Health-Syst Pharm. 2020 https://doi.org/10.1093/ajhp/zxaa036
2. Kullar R, Leonard SN, Davis SL, et al. Validation of the effectiveness of a vancomycin nomogram in achieving target trough concentrations of 15-20 mg/L suggested by the vancomycin consensus guidelines. Pharmacotherapy 2011 May; 31(5):441-448
3. Karem CM et al. Outcome Assessment of Minimizing Vancomycin Monitoring and Dosing Adjustments. Pharmacotherapy 1999; 19:257-267.
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6. Brown M, Polisetty R, Gracely EJ, et al. Weight-based loading of vancomycin in patients on hemodialysis. Clin Infect Dis 2011; 53:164.
7. Heintz BH, Matzke GR, Dager WE. Antimicrobial dosing concepts and recommendations for critically ill adult patients receiving continuous renal replacement therapy or intermittent hemodialysis. Pharmacotherapy 2009; 29:562.
8. Hall RG 2nd, Payne KD, Bain AM, et al. Multicenter evaluation of vancomycin dosing: emphasis on obesity. Am J Med 2008; 121:515.
9. Winter MA, Guhr KN, Berg GM: Impact of Various Body Weights and Serum Creatinine Concentrations on the Bias and Accuracy of the Cockcroft-Gault Equation. Pharmacotherapy 2012; 32:604-612.
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11. Winter, Michael E., Basic Clinical Pharmacokinetics, 5th ed, Lippincott Williams & Wilkins
12. Pai, Manjunath P., et al. "Simplified equations using two concentrations to calculate area under the curve for antimicrobials with concentration-dependent pharmacodynamics: daptomycin as a motivating example." Antimicrobial agents and chemotherapy 58.6 (2014): 3162-3167.

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15. Young T, Daniel M, Baumhover S, Eidson D, Green J. Methodological Study of Vancomycin Dosing in Elderly Patients Using Actual Serum Creatinine Versus Rounded Serum Creatinine. Drugs in R&D. 2017 Sep 1;17(3):435-40
16. Adane, Eyob D., Michael Herald, and Firas Koura. "Pharmacokinetics of vancomycin in extremely obese patients with suspected or confirmed Staphylococcus aureus infections." Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy 35.2 (2015): 127-139.
17. Denetclaw, Tina Harrach, et al. "Performance of a Divided-Load Intravenous Vancomycin Dosing Strategy for Obese Patients." Annals of Pharmacotherapy 49.8 (2015): 861-868.
18. Grace, Edward. "Altered vancomycin pharmacokinetics in obese and morbidly obese patients: what we have learned over the past 30 years." Journal of antimicrobial chemotherapy 67.6 (2012): 1305-1310.
19. Hong, Joseph, et al. "Individualized Vancomycin Dosing in Obese Patients: A Two-Sample Measurement Approach Improves Target Attainment." Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy35.5 (2015): 455-463.
20. Kubiak, David W., et al. "An Evaluation of Systemic Vancomycin Dosing in Obese Patients." Open forum infectious diseases. Vol. 2. No. 4. Oxford University Press, 2015.
21. Leong JV et al, Determining vancomycin clearance in an overweight and obese population, Am J Health-Syst Pharm. 2011; 68:599-603
22. Morrill HJ et al, Vancomycin Dosing Considerations in a Real-World Cohort of Obese and Extremely Obese Patients, Pharmacotherapy 2015;35(9):869–875
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24. Reynolds DC et al, Performance of a vancomycin dosage regimen developed for obese patients, Am J Health-Syst Pharm—Vol 69 Jun 1, 2012
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B. Original Document:
   1. Owner: SASS team
   2. Author and date: Emily Mui, Pharm.D. BCPS: 08/2013
   3. Stored in: Pharmacy – Departmental Manual
C. Review and Renewal Requirements:
   1. This policy will be reviewed and/or revised every three years or as required by change of law or practice.
D. Review and Revision History:
   1. 06/2015, , 10/2016 Lina Meng, Pharm.D., BCPS, BCCCP
   2. 08/2016, 4/2018 Lina Meng, Pharm.D., BCPS, BCCCP ; Emily Mui, Pharm.D., BCPS; Janjri Desai, Pharm.D., MBA, BCPS
   3. 10/2015, 03/2016, 05/2018 Janjri Desai, Pharm.D., MBA, BCPS
   4. 8/2020 Lina Meng, PharmD, Pharmacy; Jamie Kuo, Pharm D, Manager, Pharmacy; Janjri Desai, PharmD, MBA Assistant Director of Pharmacy Quality; Stanley Deresinski, MD, P&T Committee Chair Medical Director, Antimicrobial Stewardship
E. Approvals:
   1. 08/2013, 5/2018 Antibiotic Subcommittee
   2. 11/2015, 03/2016, 9/2016, 6/2018, 08/2020 Pharmacy and Therapeutics Committee
   3. 08/2020 Pharmacy and Therapeutics Committee
   4. 11/2020 Medical Executive Committee (MEC), SHC Hospital Board Credentials, Policies and Procedures Committee

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