Pharmacist-Focused Vancomycin Dosing Competency Program Concentrating on Dosing Strategies to Reduce Adverse Events

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Background

Vancomycin usage requires extensive therapeutic monitoring to ensure there is a balance between promoting efficacy and limiting toxicity. Recent vancomycin dosing trends have integrated the AUC:MIC ratio to help guide therapy and reduce adverse events.[1,2] These dosing trends are supported by the new and revised consensus guidelines on 'Therapeutic monitoring of vancomycin for serious methicillin-resistant *Staphylococcus aureus* infections' released in March 2020.[3]

Currently, this organization does not have a formal program developed to set a standard for baseline vancomycin dosing knowledge, which has led to a wide variability of dosing strategies between pharmacists.

Purpose

It is hypothesized that completing the educational program will set the standard for vancomycin knowledge between all pharmacists by providing a thorough review of traditional and AUC:MIC based dosing strategies along with increasing confidence in using the AUC:MIC ratio dosing strategy.

Methods

An educational program focusing on traditional and AUC-based vancomycin dosing strategies was conducted throughout eight pilot sites within a particular home infusion pharmacy. The program included a pre- and post-education survey incorporating patient cases to assess knowledge. Survey results are anonymous.

Questions on the surveys were categorized into seven different competency objectives: assessing appropriateness, ability to use valid tools, recommending dose adjustments, creating an appropriate monitoring strategy, patient specific pharmacokinetic calculations, understanding basic drug properties, and self-declared confidence. Overall percentage scores for each competency objective have been compared to assess for improvement from baseline knowledge.

Statistical comparisons were conducted using Chi-squared tests for categorical competencies such as assessing appropriateness, ability to use valid tools, recommending dose adjustments, creating appropriate monitoring strategies, pharmacokinetic calculations and understanding drug properties. Continuous competencies such as self-declared confidence in trough based and AUC:MIC dosing were performed using Welch's t-test assuming unequal variances. Statistical significance was set at p<0.05.

Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Shelby Dick, Suzanne Kluge, Kathi Andrusko-Furphy, Julia Gloe, Uddyalok Banerjee; Nothing to disclose.

FIGURE 1:

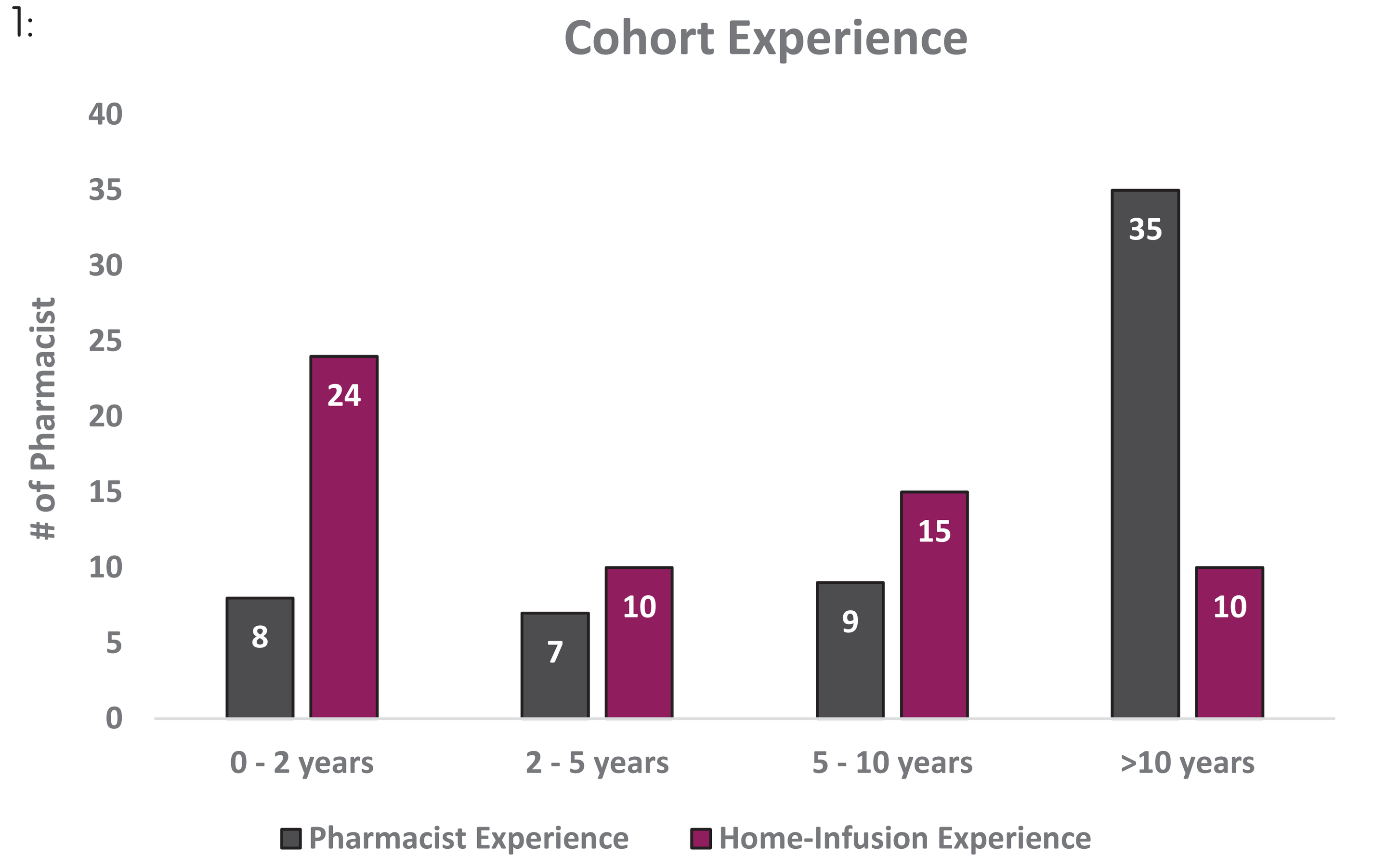

TABLE 1:

Competencies	Pre Learning Test	Post Learning Test	P-value
Assessment appropriateness	32.2%	88.4%	<0.01*
Ability to use valid tools	68.6%	76.7%	0.12
Recommending dose adjustments	37.3%	74.4%	<0.01*
Create appropriate monitoring strategy	33.9%	67.9%	<0.01*
Patient specific pharmacokinetic calcs	37.3%	73.6%	<0.01*
Understanding basic drug properties	53.4%	74.4%	<0.01*
Self-declared confidence	6.0 (4.0-9.0)	8.0 (6.0-9.0)	<0.01‡
- Trough based dosing	8.0 (7.0-10.0)	8.5 (7.3-10.0)	0.46
- AUC:MIC dosing	4.0 (2.0-5.5)	7.0 (5.0-8.0)	<0.01‡

** Statistical significance p<0.05 using Chi-Squared test for categorical variable*
‡ Statistical significance p<0.05 using Welch's t-test for continuous variables
Results of multiple-choice questions have been expressed as % (correct/total), and results of 1-10 scale questions have been expressed as median score (inter-quartile range)

Results

59 pharmacists completed the pre-competency program test, and 54 pharmacists completed the post-competency program test. Of these pharmacists, a majority (59.3%) have been practicing 10+ years while a large portion (57.6%) have been practicing in home infusion for <5 years *(Figure 1)*.

Table 1 summarizes pre- and post-competency program test results for all competency objectives evaluated in this study. Notably, the average confidence rating for trough based dosing and AUC:MIC based dosing before the competency program were 7.8/10 and 4.1/10, respectively. The confidence using trough-based dosing strategies increased to 8.1/10 following the competency program while confidence using AUC-based dosing increased by 64.2% to an average of 6.7/10. It was also determined that 83.3% of pharmacists that completed the module feel that they can confidently dose vancomycin using both trough and AUC-based dosing strategies.

The increase in self-declared confidence in AUC:MIC based vancomycin dosing determination was significant (p<0.01), however confidence in trough based dosing did not significantly (p=0.46) increase. Taken together, there was a significant increase in self-declared confidence in vancomycin dose determination (p<0.01) after the completion of the competency program *(Table 1)*. Scores increased significantly (p<0.01) for each competency objective with the exception of the 'ability to use valid tools' competency category *(Table 1)*. This category had the lowest increase (8.1%) in score. The 'assessing appropriateness' competency category had the greatest improvement with a 56.2% increase in scores.

Discussion

Although it may be difficult to generalize knowledge assessment data from a small cohort, it was shown that reinforcing strategies for dosing vancomycin increased pharmacists' knowledge and confidence. In the long-term, the implementation of this competency program will expect a reduction in adverse events rates related to dosing and monitoring vancomycin.

Conclusion

This project has led to the creation of a formal training program to standardize vancomycin dosing competency for pharmacists, ultimately creating a clinical competency strategy to provide optimal patient care. Future expansion of this study expects a reduction in adverse events.

References

[1] Emily L. Heil, Pharm.D., BCPS-AQ ID, AAHIVP, Kimberly C. Claeys, Pharm.D., BCPS, Ryan P. Mynatt, Pharm.D., BCPS-AQ ID, Teri L. Hopkins, Pharm.D., BCPS, Karrine Brade, Pharm.D., BCPS, Ian Watt, Pharm.D., Michael J. Rybak, Pharm.D., M.P.H., Ph.D., FCCP, Jason M. Pogue, Pharm.D., BCPS-AQ ID, Making the change to area under the curve–based vancomycin dosing, American Journal of Health-System Pharmacy, Volume 75, Issue 24, 15 December 2018, Pages 1986–1995, https://doi.org/10.2146/ajhp180034

[2] Lina Meng, Pharm.D., BCPS, BCCCP, Area under the curve–based vancomycin monitoring, American Journal of Health-System Pharmacy, Volume 76, Issue 23, 1 December 2019, Pages 1896–1898, https://doi.org/10.1093/ajhp/zxz219

[3] Michael J Rybak, PharmD, MPH, PhD, FCCP, FIDP, FIDSA, Jennifer Le, PharmD, MAS, FIDSA, FCCP, FCSHP, BCPS-AQ ID, 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, American Journal of Health-System Pharmacy, , zxaa036, https://doi.org/10.1093/ajhp/zxaa036

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