

What’s New in the Patient Safety World

May 2020

PPSA on IV Vancomycin Safety

Our August 2016 What's New in the Patient Safety World column [“Home Infusion Therapy Pitfalls”](#) highlighted a fatal case related to intravenous vancomycin therapy in the home reported by ISMP Canada ([ISMP Canada 2016](#)). The case described was a diabetic patient with a foot ulcer who was receiving IV vancomycin at home after a hospital stay. Recommended bloodwork, including trough vancomycin levels, was not done due to a faulty lab requisition. The patient developed a rash, thrombocytopenia, and high serum vancomycin levels as well as rising creatinine. He was rehospitalized but despite IV fluids and platelet transfusions, he developed hypertensive episodes, epistaxis and mental status changes and developed intracerebral bleeding and ultimately died. The acute kidney injury was attributed to vancomycin toxicity and the thrombocytopenia was also felt possibly related to the vancomycin.

That’s the only case of a vancomycin error we could find in our 14-year patient safety archive. But the Pennsylvania Patient Safety Authority just published an extensive review of safety hazards associated with intravenous vancomycin ([Krukak 2020](#)). The authors begin with the complexities of IV vancomycin use: dosing is weight-based and management requires monitoring of drug levels (peak and trough), attention to renal function, and dosing at regularly scheduled intervals. They reviewed the literature and analyzed cases involving vancomycin reported to the Pennsylvania Patient Safety Reporting System (PA-PSRS).

Their literature review identified the following issues:

- Overdosing
- Underdosing
- Failure to adjust dose based on trough levels or renal function
- Failure to monitor renal function
- IV access issues (infiltration, extravasation, need for PICC’s or other more advanced access)
- Reactions to IV vancomycin such as hypotension, chills, fever, and red man syndrome (RMS)

- Additive nephrotoxic effects when combined with some other antibiotics or other nephrotoxic medications
- Organizational barriers to maintaining special dosing intervals
- Workflow issues
- Communication issues

They then analyzed 143 reports of event reported over a 3-month period related to IV vancomycin (they excluded many more reports if there was no harm or just an unsafe condition that did not reach the patient).

Events occurred in multiple phases of the medication use process: administration (38.5%), monitoring (27.3%), ordering/reviewing (19.6%). The most frequent errors identified were dose omission/delay or receipt of partial dose (41.3%), improper dose (29.4%), and monitoring errors (18.2%).

Workflow and communication issues often contributed to missed doses, delays in doses, or suboptimal doses. Monitoring medication-use process stage issues were mostly related to timing of troughs. Difficulties were especially noted when doses and/or timing needed to be adjusted, including starting, restarting, and stopping IV vancomycin.

Workflow and communication issues typically involved handoffs and transfers, especially related to the ED and OR and transfer from these units to other units. Order sets were sometimes confusing and in other cases paper orders, faxed orders or verbal orders contributed.

Monitoring issues included lack of awareness that trough levels were ordered but not drawn, results of trough levels not promptly transmitted, or trough levels not acted upon.

They provide a terrific [self-assessment tool](#) that any organization using vancomycin should download and use. They stress the need to increase clinician awareness and developed an [infographic](#) to help promote that. But, recognizing that education and training are of limited value, they focus on potential interventions using health information technology. They note studies showing that use of a weight-based vancomycin EHR order set, specifically in ED settings, resulted in a 20% increase in appropriate dosing ([Hall 2015](#)). Other interventions included automatic ordering of a trough level 30 minutes before the fourth dose when a new vancomycin order was placed, or an alert in the nurse's barcode administration of vancomycin if no trough level had been drawn. One of our own recommendations would be to use clinical decision support to generate an alert when a specified increase in serum creatinine is seen after vancomycin is started.

This is a really good study that has valuable lessons. Issues related to errors in IV vancomycin use probably are underreported and “fly under the radar” in many healthcare organizations. This study should be a wakeup call for all.

References:

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(Hall 2015)



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