



Evaluation of Vancomycin Based on Healthcare Infection Control Practices Advisory Committee Guideline in Emam Khomeini Hospital of Urumie



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ABSTRACT

Background: The present study was conducted to evaluate the use of vancomycin according to the Healthcare Infection Control Practices Advisory Committee guidelines in the Imam Khomeini hospital of Urmia.

Methods: This retrospective study was conducted in Urmia Imam Khomeini Hospital (intensive care unit, surgery, internal medicine, and dialysis wards). In the retrospective phase, the demographic and clinical data related to all patients who were treated with vancomycin in April, May, and June 2015 were collected according to a HICPAC-based questionnaire. The level of compliance of vancomycin with the recommendations mentioned was determined. Non-compliance with the instructions was identified as the goal of the next interventions.

Results: The results of our study showed that the highest starting doses were among the patients with pneumonia. We did not measure the serum level of vancomycin in none of the patients studied. The duration of treatment for patients was 4.45 ± 4.91 days. Also, our results showed that 68.5% of patients had no antibiogram before the treatment.

Conclusion: The obtained findings showed that the necessity of an antibiogram and patient's weight measurement and avoiding the simultaneous use of broad-spectrum antibiotics and measuring the serum level of vancomycin in order to promote patients' treatment and promote the use of broad-spectrum antibiotics Vancomycin should be taken into consideration.

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1. Introduction

Attempts to rationalize drug use, as one of the important issues of drug policy, have always been considered. According to the World Health Organization (WHO), in order to achieve the rational use of the drug, it is necessary to use appropriate therapeutic drugs that can meet the clinical needs of patients living in all geographical areas with the least cost, while paying attention to the dose and duration of drug use is very important. In many countries, antibiotics contain about 30%-50% of prescribed drugs among the therapeutic agents. Although antibiotic administration is essential in most bacterial infections and its no use is life-threatening, most studies have shown that 30 to 60% of prescriptions are inaccurate and inappropriate, usually by physicians, distributors, and or self-medication [1-3].

Vancomycin is an antibiotic of the glycopeptide family, which was initially limited due to its side effects [4]. However, with the advent of Methicillin-Resistant Staphylococcus Aureus (MRSA), its re-use began [5]. Currently, vancomycin is a selective drug for most patients with known or suspected MRSA or Methicillin-Resistant Staphylococcus Epidermidis (MRSE) infections. In addition, the use of vancomycin is recommended for potentially life-threatening pneumococcal infections as long as microorganisms are susceptible [6]. Enterococci are involved in bacteremia, urinary tract infections, endocarditis, surgical infections, and intra-abdominal infections. Unfortunately, over the past two decades, Vancomycin-Resistant Enterococci (VRE) have spread throughout the world and are one of the main causes of hospital infections [7].

VRE infections may be associated with morbidity and mortality, longer hospital stay, and higher costs of hospitalization [8]. In addition to enterococci, staphylococcus aureus with intermediate sensitivity to Vancomycin (VISA) as well as Vancomycin-Resistant Staphylococcus (VRSA) has also been reported [9].

Vancomycin inhibits the formation of peptidoglycan polymer by inhibiting the formation of the cell wall in bacteria and the bacterial cell lysis, and also the cell membrane is damaged, thereby applying its antibacterial effect. In this regard, vancomycin first establishes a solid attachment to the end of the D-alanine pentapeptide, which inhibits the bacterial cell wall and prevents the length of the strand from lengthening. The cell wall is weakened and susceptible to destruction [4, 5].

Some studies have indicated that the recommended dose in published guidelines is not always sufficient, because in many cases, it does not reach the level of treatment. However, some others have suggested that vancomycin should be taken at the start of antibiotics and there is no specific dose. It has been indicated that the recommended dose in published guidelines is not always sufficient because in many cases, it does not reach the therapeutic level. Therefore, therapeutic monitoring, dose flexibility, optimal dose, and evaluating renal function are very important in the treatment of vancomycin [10, 11].

Proper use of vancomycin

As the first line of treatment

- *Staphylococcus aureus* resistant to methicillin-proven or coagulase-negative staphylococci- Severe infections with high suspicion of Staphylococcal infection, such as a central venous catheter, prosthetic devices, etc.
- Endocarditis due to methicillin-resistant staphylococci
- Meningitis due to penicillin-resistant flavobacteria or pneumococcus, central nervous system shunt infection with methicillin-resistant staphylococci
- Infection with methicillin-sensitive organisms
- Prophylaxis for surgery, up to two days
- Methicillin-resistant enterococcal infection

In patients with allergies to beta-lactam

- As an alternative treatment for endocarditis with diphtheria, Staphylococcus aureus, enterococcus (plus gentamicin)
- Meningitis and cerebrospinal fluid shunt infections by diphtheria or Gram-positive cocci
- Severe infection with Gram-positive cocci

Drug Utilization Evaluation (DUE) pattern studies have been introduced as defining progressive and appropriate programs that examine and analyze drug use patterns in a treatment center in comparison with standard criteria. According to the WHO, DUE studies include the distribution, prescribing, and use of drugs in the community, with emphasis on medical, social, and economic outcomes. Successful implementation of a DUE study will ensure the proper, safe, and effective use of medications. One

of the goals of implementing confidence programs is the rationality of the quality of drug use, the health of patients, prediction and timely prevention of side effects, drawing the pattern of drug use in the community, and reducing waste costs [1]. In this study, the evaluation of how to use vancomycin according to the DUE guidelines at Imam Khomeini hospital and Taleghani Educational hospital of Urmia was studied.

2. Methods

This descriptive-analytic study was carried out retrospectively in Imam Khomeini hospital (intensive care unit, surgery, internal medicine, and dialysis wards) and the infectious diseases ward of Taleghani hospital, Urmia. In the retrospective phase, the demographic and clinical data related to all patients who were treated with vancomycin in April, May, and June 2009 were collected based on a questionnaire set up in accordance with the HICPAC guidelines. Patients were referred to the questionnaire according to the physician's opinion on reflux, relative healing, and improvement. The clinical data included fever (axillary temperature above 37.5° C), tachycardia (increased heart rate above 110 beats) hypotension (hypotension lower than 85 mm Hg for systolic and 65 mm Hg for diastolic (leukocytosis) and white blood cell count above 12000 cells/mm3. The signs noted by patients, such as confusion, diarrhea, and dyspnea were recorded in the pre-prepared checklist.

3. Results

In our study, a total of 200 patients were enrolled according to inclusion criteria, of whom 100 patients were from Imam Khomeini hospital and 100 patients from Taleghani hospital.

The demographic characteristics of patients

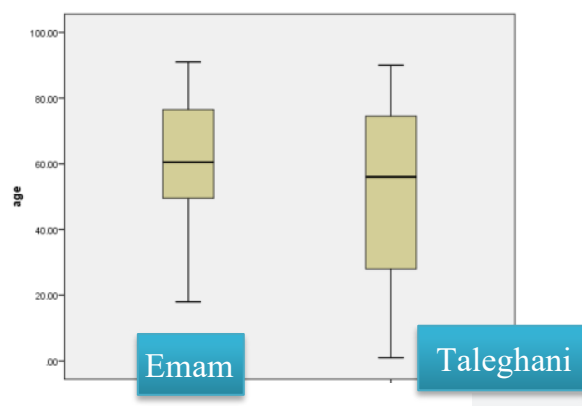


Figure 1. The distribution of weight among patients

In our study, the Mean±SD age of patients was 43.55±22.65 years. The Mean±SD age of patients admitted to Taleghani hospital was 51.98±25.10 years and the Mean±SD age of patients admitted to Imam hospital was 59.87±19.49 years and there was a statistically significant difference in age of patients in the two groups (P=0.014) (Figure 1). Also, 112 cases (56%) were male and 88 cases (44%) were female. There was no significant difference regarding gender in the two hospitals (P=0.569).

The Mean±SD weight of the patients was 80.11±23.16 kg. The lowest weight of the patients was 21 kg and the highest weight was 184 kg. The Mean±SD weight of the patients admitted to Imam Khomeini was 51.98±25.10 and 51.98±25.10 kg in Taleghani hospital and the two groups did not have a significant difference (P=0.053) (Figure 2).

Of the patients studied, 70 cases (35%) had a complete response to treatment, 100 cases (50%) showed a relative improvement, and 30 patients (15%) died. There was no statistically significant difference between the two hospitals in terms of prognosis (P=0.839).

Signs and symptoms of patients

In our study, the signs and symptoms of patients after the start of antibiotics were studied. The results showed that 30 patients (15%) had leukocytosis and 21 patients (10.5%) had leukopenia.

The duration of antibiotic therapy

The Mean±SD duration of the onset of antibiotics for patients was 10.67±7.65 days. The maximum duration of

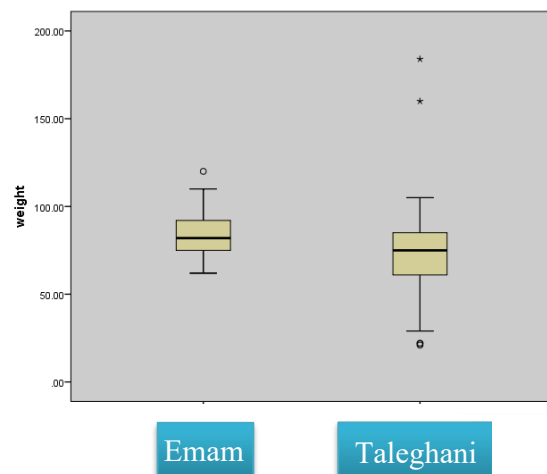


Figure 2. The distribution of age among patients

antibiotic treatment was 45 days and the minimum time was one day. The Mean±SD duration of antibiotic use was 9.42±6.89 days in Imam Khomeini hospital and 11.91±8.19 days in Taleghani hospital and there was a significant difference between the two hospitals regarding the onset of antibiotics (P=0.022).

Duration of treatment with vancomycin in studied patients

The results showed that the Mean±SD duration of treatment for patients was 4.45±4.91 days. Vancomycin was studied in patients 1 g twice daily in all patients. In studied patients, only one out of 13 patients with dialysis had a dose after the start of treatment. The Mean±SD duration of treatment for patients admitted to Imam hospital was 7.25±5.7 days in Imam hospital and 8.77±6.79 in Taleghani hospital, which was statistically significant (P=0.088).

Also, according to the patients' record, 15 patients were reported with vancomycin sensitivity, of whom 10 cases (10%) were in Taleghani hospital and 5 cases (5%) in Imam Khomeini hospital. The study of drug injection showed that 94 cases (94%) had the bullous injection and 6 cases (6%) had infusion for one hour in Taleghani hospital. In Imam Khomeini hospital, 10 cases (10%) had the bullous injection and 90 cases (90%) had infusion for one hour.

4. Discussion

Our results showed that the mean age of the patients studied was 55 years, however, in similar studies, the age range was 25-40 years [12]. The reason for this difference can be patients treated with vancomycin. The results of our study showed that the highest starting was among the patients with pneumonia. In none of the patients studied, the level of vancomycin was measured. The Mean±SD duration of the treatment for the patients was 4.45±4.91 days. Also, getting wrinkles was not observed in 68.5% of the patients before treatment was initiated.

5. Conclusion

The results of this study showed that the necessity of antibiogram and patients' weight measurement, avoiding the simultaneous use of broad-spectrum antibiotics, measuring the serum level of vancomycin in order to promote patients' treatment, and promoting the use of broad-spectrum antibiotics, such as vancomycin should be taken into consideration.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the Urmia University of Medical Sciences in each hospital.

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Authors contributions

All authors contributed in preparing All parts of the article.

Conflict of interest

The authors declared no conflict of interest.

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