Cefepime Induced Neutropenia Rates in the Home Infusion Setting

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Background

Recent data have shown an increased rate of cefepime induced neutropenia (CIN) by means of intravenous (IV) push.[1] Intravenous push is one of the preferred methods of administration in the home infusion setting.

This study will analyze patients serviced from January 2019 to December 2019 and identify possible trends of neutropenia in patients receiving cefepime. The information generated from this study will then be compared to patients using non-IV push methods such as gravity and elastomeric devices.

Purpose

The purpose of this project is to investigate laboratory outcomes of adult patients on cefepime via IV push. It is hypothesized the data will look similar to previously reported data, showing an increased rate of neutropenia in patient receiving cefepime via IV push.

Methods

A retrospective cohort analysis will be conducted looking at adult patients 18 years or older from January 2019 to December 2019. Baseline absolute neutrophil counts (ANC) will be compared to end of therapy values. Neutropenia will be defined as a reduction of absolute neutrophil count during a course of cefepime to ≤1,700 cells/ mm3.

183 patients from different sites across the country on therapy for at least 10 days were included. Patients were excluded if they were on dialysis, if there were adherence issues, missing lab information, change in routes of administration, taking colony-stimulating factors or if patients already had neutropenia. Once the data was gathered, 3,274 patients were than filtered to 1,812 patients who were IV push administration and 1,453 by gravity. See Figure 1 for visual layout.

Then a random number generator (www.random.org) was used to select patients to be included into the study. A Chi-squared test was performed for categorical variables, and a 2-way t-test assuming unequal variances were used for continuous variables. This study is considered exempt from IRB under 45 CFR 46.10(b)(4).

Figure 1 - Design Layout of the Trial

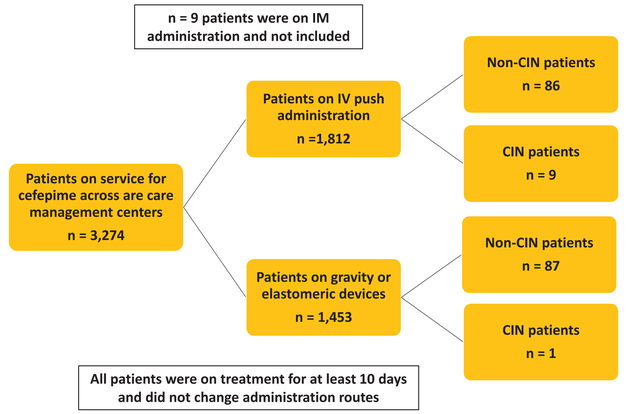

Table 1 - Statistical Data Comparing the Number of CIN vs Non-CIN Patients Including Demographics Baseline and Final ANC

Variable	CIN (n=10)	Non-CIN (n=183)	p value
Age, median (IQR)	52 (41-60)	60 (49-68)	0.50
Gender			0.31
Male, n(%)	8 (80.0%)	111 (64.2%)	
Female, n(%)	2 (20.0%)	62 (35.8%)	
Method of Delivery			0.01‡
IV Push	9 (90.0%)	86 (49.7%)	
Gravity	1 (10.0%)	87 (50.3%)	
Baseline ANC, as cells/mm^3, median (IQR)	3.7 (2.7-4.3)	4.7 (3.4-7.1)	<0.01*
Endpoint ANC, as cells/mm^3, median (IQR)	0.9 (0.3-1.3)	4.3 (3.2-5.8)	<0.01*
Cumulative Cefepime Dose, in g, median (IQR)	94 (59-166)	124 (80-188)	0.1
Duration of therapy, in days, median (IQR)	32 (28-38)	36 (27-45)	0.04*
Concurrent use of other Therapy			0.81
Yes	7 (70.0%)	127 (73.5%)	
No	3 (30.0%)	46 (26.5%)	

‡ Statistically Significant p<0.05 using Chi-Squared test for categorical variable

* Statistically significant p<0.05 using 2-way t-test for continuous variables

Results

Our results show that patients receiving cefepime via IV push were significantly ($p<0.05$) more prone to manifest neutropenia as compared to patients receiving the drug via other means such as gravity and disposable pumps. Interestingly, patients who acquired neutropenia during cefepime cycles had significantly ($p<0.01$) lower baseline ANCs at onset, and were on therapy for significantly ($p<0.05$) shorter duration. Refer to Table 1 for additional information.

Discussion

This study shows an increase in rates of neutropenia in patients receiving cefepime via IV push administration compared to other administration methods. Out of the 10 patients who developed neutropenia, 9 were administered by IV push. It is important to note the baseline ANC were significantly different when comparing the CIN to non-CIN groups. Further research should be conducted on a larger scale to further understand the relationship of neutropenia and administering cefepime via IV push.

Conclusion

When comparing routes of administration, IV push showed an increased rate of neutropenia compared to gravity.

References

[1]Foong, K. S., Hsueh, K., Bailey, T. C., Luong, L., Iqbal, A., Hoehner, C.& Ritchie, D. (2019). A Cluster of Cefepime-induced Neutropenia During Outpatient Parenteral Antimicrobial Therapy. Clinical Infectious Diseases, 69(3), 534-537.

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: Dustin Lee , Jay Winters, Maria Giannakos, Uddyalok Banerjee; Nothing to disclose.

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