Comparison between two methods for evaluation of the dialysis dose quality*

Correlação entre métodos de avaliação da qualidade da dose de diálise

La correlación entre los métodos de evaluación de la calidad de la dosis de diálisis

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ABSTRACT

Purpose: To compare calculated Kt/V and Kt/V-OCM methods of dialysis dose. **Methods:** This was a cross-sectional retrospective study with 14 patients who underwent 106 hemodialysis using Fresenius 4008S dialysis machine in the critical care unit of the "Noroeste Parana Teaching Hospital" from November 2007 to April 2008. **Results:** Shapiro-Wilk test indicated that there was no normal distribution between the calculated Kt/V and the machine Kt/V ($p>0.05$). Wilcoxon test showed a statistically significant difference between the two measurements ($p <.0001$). **Conclusion**: There is a need for further studies that consider all factors involved with the online calculation of the urea depuration for the utilization of the Kt/V-OCM.

Keywords: Renal dialysis; Nursing care; Quality assurance, health care

RESUMO

Objetivo: Verificar a correlação entre o Kt/V calculado e o Kt/V-OCM. **Métodos:** Estudo transversal, retrospectivo, com 14 pacientes submetidos a 106 hemodiálises com a máquina Fresenius 4008S, realizado numa Unidade de Terapia Intensiva para adultos, de um Hospital de Ensino do noroeste do Paraná, no período de novembro/2007 a abril/2008. **Resultados:** Através do teste de Shapiro-Wilk, ($p>0,05$), foi constatado que não houve distribuição normal entre o "Kt/V calculado" e o "Kt/V da máquina". **Conclusão:** Pelo teste de Wilcoxon concluiu-se que houve diferença significativa ($p< 0,0001$) entre as duas medições. Sugere-se a realização de novos estudos que levem em consideração todos os fatores envolvidos no cálculo *on-line* da depuração de uréia para que o Kt/V-OCM possa ser utilizado.

Descritores: Diálise renal; Assistência de enfermagem; Garantia da qualidade dos cuidados de saúde

RESUMEN

Objetivo: Verificar la correlación entre el Kt/V calculado y el Kt/V-OCM. **Métodos:** Estudio transversal, retrospectivo, con 14 pacientes sometidos a 106 hemodiálisis con la máquina Fresenius 4008S, realizado en una Unidad de Cuidados Intensivos para adultos, de un Hospital Docente del noroeste del Paraná, en el período de noviembre/2007 a abril/2008. **Resultados:** A través del test de Shapiro-Wilk, ($p>0,05$), se constató que no hubo distribución normal entre el "Kt/V calculado" y el "Kt/V de la máquina". Por el test de Wilcoxon hubo diferencia significativa ($p< 0,0001$) entre las dos mediciones. **Conclusión:** Se sugiere la realización de nuevos estudios que tengan en consideración todos los factores involucrados en el cálculo *on-line* de la depuración de urea para que el Kt/V-OCM pueda ser utilizado.

Descriptores: Diálisis renal; Atención de enfermería; Garantía de la calidad de atención de salud

* *Study performed in a School Hospital ICU for adults in Paraná Northwest*

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INTRODUCTION

The removed urea quantification is the key parameter to enhance the substitutive renal therapy effectiveness for chronic renal failure patients, for the dialysis dose is defined through it[1]. In general, the calculation for such removal is based on a Kt/V measure, which includes urea kinetic models in different body compartments and an approximate urea volume distribution average[2].

The Intermittent Hemodialysis Dose (IHD) determination for acute renal failure treatment in the Intensive Care Unit (ICU) is difficult, because of the hipercatabolism, the hemodynamic instability, and the poor blood flow regional distribution. Such factors influence the urea distribution volume that is considered stable in the existing kinetic models[1].

An alternative for the hemodialysis dose monitoring is the *online clearance* (OCM), which forecasts the Kt/V without blood collection and in real time during each IHD session. The method is based on small cells movement, usually sodium, that alter the dialyzer transmembrane conductivity and relate to the urea effective *clearance*[3].

Therefore, the Kt/V-OCM usage reduces operational costs, as well as risks to the health of patients and healthcare professionals who perform the dialysis procedure, besides being a useful tool for ICU usage.

Upon the fact dialysis dose monitoring corroborates with the quality of treatment offered to the serious Acute Renal Failure patient, and is also available through Kt/V-OCM, the present study was developed, aiming to verify the correlation between the calculated Kt/V and the Kt/V-OCM.

METHODS

A transversal, retrospective study performed in a School Hospital ICU for adults in Paraná Northwest, from November, 2007, to April, 2008.

Fourteen patients with a history of 106 IHD sessions with Fresenius® 4008 S device, and Kt/V-OCM measurement available were included. For the data collection, an instrument elaborated especially for this study was used. It was previously validated in a pilot study, which was performed through a consultation to the sample subjects' history files.

The "calculated Kt/V" was obtained through Daurgidas[4] formula application and the "machine Kt/V" refers to the Kt/V-OCM indicated by the Fresenius 4008S device by the end of each IHD session.

The data were compiled and treated in electronic database. For the statistical analysis, the Shapiro-Wilk test was performed, for both the "calculated Kt/V" and the "machine Kt/V", so as to verify whether the data are normally distributed (if p-value > 0,05). Afterwards, the Wilcoxon test was performed in order to compare the two Kt/V results and the significant difference of p-value < 0,05 was taken into consideration.

The descriptive analysis data are presented in a table, so as to make the two Kt/V results correlation visualization easier.

It is important to highlight that the ethical and legal aspects[5] in vigor for researches with human beings were respected, and the project was approved by the Human Being Research Ethics Committee of Universidade Estadual de Maringá (Parecer 299/2008).

RESULTS

The Shapiro-Wilk test was performed for both the "calculated Kt/V" and "machine Kt/V", so as to verify whether the data are in a normal distribution. The results demonstrated that the data distribution is not normal, because the p-value result was < 0,05 for two variables.

It is possible to notice in Table 1 that the "calculated Kt/V" and the "machine Kt/V" did not present the same results. A p-value < 0,0001 was observed through the Wilcoxon test, thus demonstrating a significant difference between the two measurement methods.

DISCUSSION

There are three main factors that affect the urea depuration in the blood water portion, they are: the blood flow speed, the dialysis solution flow speed, and the effectiveness of the dialyzer utilized[2]. Although the urea *clearance* main determiners were different in the IHD, the "calculated Kt/V" measure was similar to the "machine Kt/V", however, it does not justify such difference, and due to the lack of similar Brazilian studies, it was not possible to compare the results observed.

The Kt/V-OCM reading may have been influenced by the difficulty to monitor blood pressure through the IHD system. This occurs because, in general, the access pressure is too negative, either due to the patient poor hemodynamic/volemic condition or the hemodialysis

Table 1 – Descriptive measures for the variables "calculated Kt/V" and "machine Kt/V".

Descriptive measures	Average	Median	Minimum	Maximum	1° quarter	3° quarter	Standard-Deviation
Calculated Kt/V	0.96	0.91	0.38	2.01	0.78	1.06	0.29
Machine Kt/V	1.12	1.08	0.44	3.19	0.91	1.28	0.37

catheter inadequacy. In spite of these factors, because the Kt/V-OCM is a valuable resource that brings several benefits to enhance the IHD patients care quality, it has to provide the same results the Kt/V calculated by Daurgidas formula.

It is important to highlight that, when the blood pressure monitoring is turned off, the blood flow programmed in the pump is the only indicator left, and it is not an accurate measure of the effective debit. Thus, it is extremely important to guarantee the hemodialysis catheters functioning so that they can reach the blood volume prescribed, and the system pressure levels are maintained within normal limits. Finally, the IHD dose depends, among other factors, on the blood speed, and the harmful effects caused by very negative access pressures in long term repeated IHD sessions are not known.

CONCLUSION

The conclusion was that there are no relations between the calculated Kt/V and the machine Kt/V, for the difference between them was statistically significant (p-value < 0,0001).

Based on the results and methods of analysis used in the present study, it is possible to state that Kt/V-OCM did not have any relation with the urea effective *clearance*, but this may have occurred due to interferences in the *online* calculation.

Studies treating the theme approached in this research are scarce to compare the results. It is important that other researches approaching the dialysis dose monitoring theme are performed, considering all the factors involved in the urea depuration *online* calculation to verify whether the difference observed will persist.

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