Hypophosphataemia in patients on Continuous Renal Replacement Therapy in ITU

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Introduction

Serum phosphate concentration is maintained between **0.81 and 1.45 mmol/L**.

Hypophosphataemia may lead to a multitude of complications in critically ill patients including myocardial dysfunction, diaphragmatic weakness, haemolysis and a **higher risk of mortality in the ITU population**[1-6].

This is pertinent as the composition of the **dialysate** used in Continuous Renal Replacement Therapy (CRRT) promotes a **hypophosphataemic state**.

Objective

To describe the **incidence of hypophosphataemia** (serum phosphate <0.8 mmol/L) in patients on CRRT in ITU.

To establish whether there is an association between **hypophosphataemia** and **mortality**.

Serum PO_4	Variable	No.	%
<0.8 mmol/L	Total	30	68.2
	Pre CRRT	5	11.4
	During CRRT	26	59.1
<0.6 mmol/L	Total	18	40.9
	Pre CRRT	4	9.1
	During CRRT	15	34.1
<0.4 mmol/L	Total	8	18.2
	Pre CRRT	1	2.3
	During CRRT	7	15.9

Table 1: Incidence of Hypophosphataemia

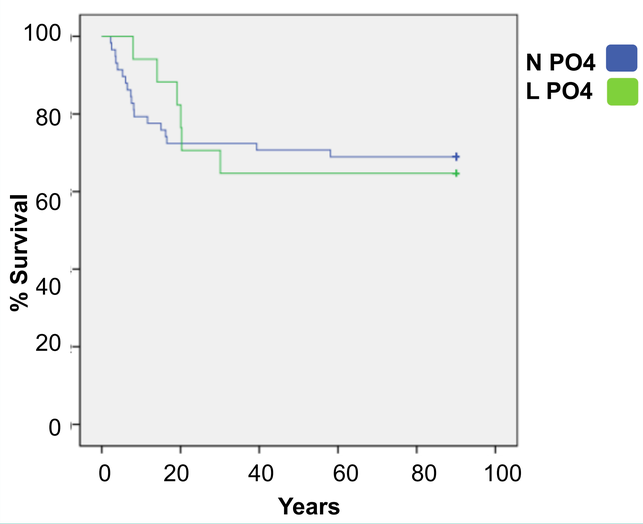
Method

A **retrospective analysis** was conducted of **44 patients** who were admitted to ITU in Cork University Hospital between January 2019 to June 2019 and required **CRRT**.

Patient **comorbidities** were collected and used to calculate the Charlson Index, SOFA and APACHE score for each patient[5,6].

Serum phosphate levels and Acute Kidney Injury (**AKI**) status prior to CRRT were collected.

The **duration of CRRT** and the **serum phosphate levels** during CRRT were also collected and patient mortality was recorded. **Bivariate analysis** was applied.



Graph 1: Kaplan-Meiher hypophosphataemia mortality estimation

Results

The primary indication for initiating CRRT in these patients was an **AKI** (81%). The majority of patients had a severe Acute Kidney Injury (**AKIN 3**) on initiation of CRRT at 64% with only 7.7% having an AKIN 1 and also AKIN 2, whilst the remaining had no AKI. The primary cause for AKI was **acute tubular necrosis**.

The **incidence** of hypophosphataemia was calculated and is described in **Table 1**.

Prolonged CRRT time was the only variable associated with hypophosphataemia (p=0.02).

Mortality related to hypophosphataemia was estimated using **Kaplan-Meiher graphics** shown in **Graph 1**. **Advanced patient age** (p=0.05), **prolonged admission** (p=0.04) and a **higher Charlson index** (p=0.039) were associated with a higher risk of mortality at 90 days.

Hypophosphataemia was not associated with a mortality risk (p=0.56, OR 0.5, CI 0.05-5.09).

Conclusion

Hypophosphataemia is impacted by the **duration of CRRT**. This is likely due to the **Dialysate composition**.

Hypophosphataemia was **not associated** with **mortality**. Given the Charlson score is a morbidity index, it is unsurprising that a higher Charlson score is associated with a higher risk of mortality[5].

Surprisingly, the **APACHE and SOFA scores**, both indices of mortality in ITU, did not yield an association with mortality. Larger studies have demonstrated an association between mortality and hypophosphataemia, as well as with the APACHE and SOFA scores[5,7].

It is likely that **our sample size is too small** and therefore our results are **underpowered**. We are currently performing a similar study on a much larger population with the ultimate aim of implementing a new phosphate supplementation CRRT protocol in ITU.

References

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