

NOCTURNAL IN-CENTRE HAEMODIALYSIS: AN AUSTRALIAN COHORT EXPERIENCE



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INTRODUCTION

Conventional in-centre haemodialysis (CICH) is the predominant dialysis regimen for patients with end-stage kidney disease (ESKD) throughout most of the world. Patients undergoing CICH (4-5 hours of dialysis three times per week) experience reduced quality of life, and are often inadequately treated, necessitating higher medication requirements and more frequent medical assessment.¹

There is increasing evidence that longer dialysis treatment time improves patient outcomes,^{2,3} however many physically and socially disadvantaged patients are unable to access the support required to pursue home-based dialysis. Nocturnal in-centre haemodialysis (NICH) was established at our centre in 2011, creating an opportunity for these patients to benefit from extended-hours dialysis. A total of 13 patients have used the service since its inception, undergoing thrice-weekly 8-9 hour sessions.

This study sought to compare clinical outcomes during time on CICH and NICH, with each patient serving as their own control, thereby accounting for potential selection bias in the recruitment of patients to NICH.

METHOD

We conducted a retrospective analysis of all patients on NICH for a minimum of 3 months (n= 11). Electronic hospital records were used to source data for patients during time on CICH and NICH (2004-2015).

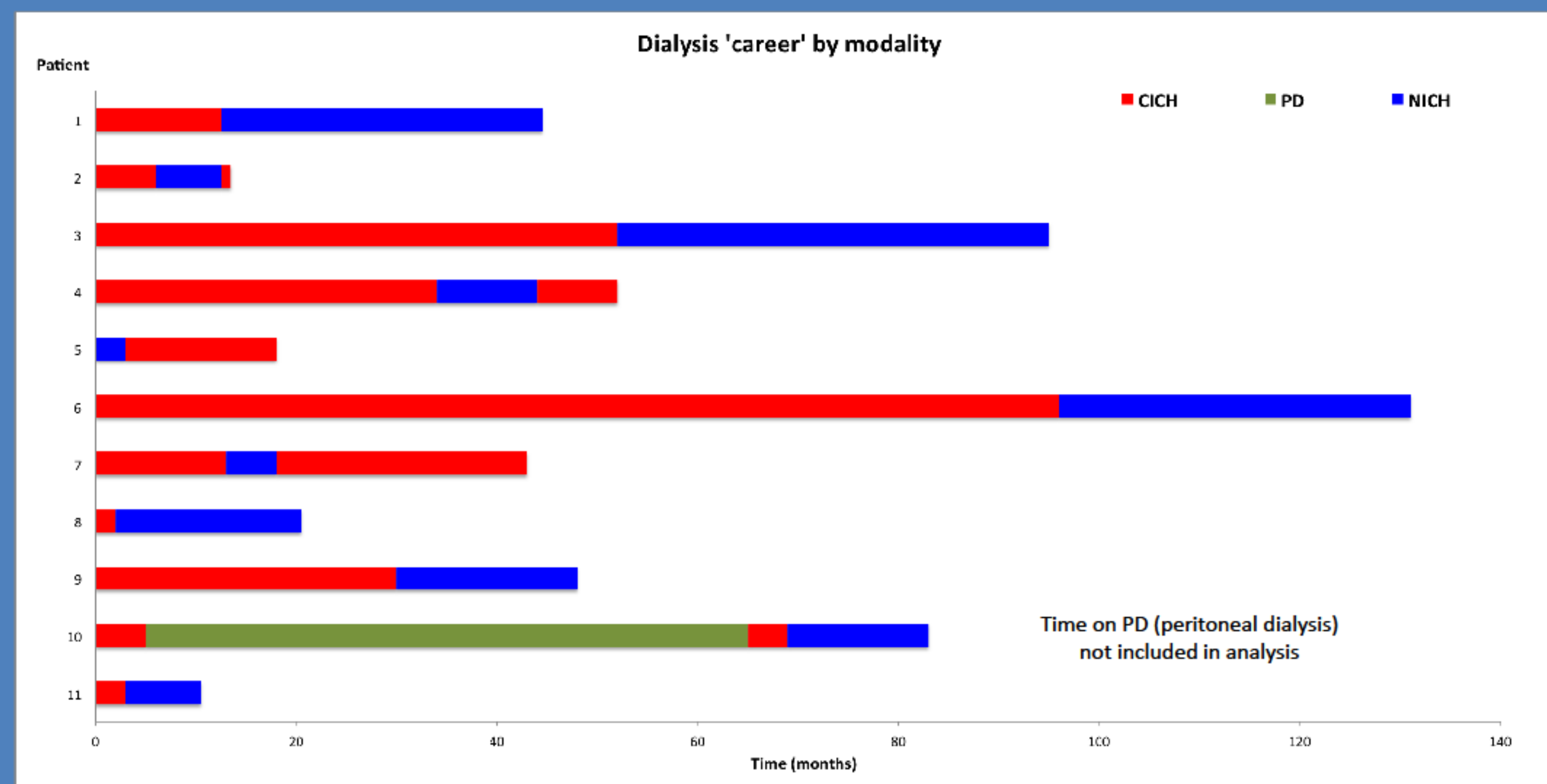
Laboratory data extracted included all measured values during patients' time on CICH and NICH for haemoglobin (g/L), corrected calcium (mmol/L), phosphate (mmol/L), albumin (g/L) and parathyroid hormone (pg/mL, upper limit of normal range =68).

Medication doses were obtained from patient records, including phosphate binder dose (tablets/day), and intravenous erythropoietin (EPO) dose (units/week). For patients on darbepoietin alpha, dosage was converted using 1mcg=200units.

All hospital admissions were recorded, using discharge summaries to specify the reason for admission.

Data was analysed using multi-level modelling, inclusive of up to 3 years on each modality (to reduce the impact of significant outliers).

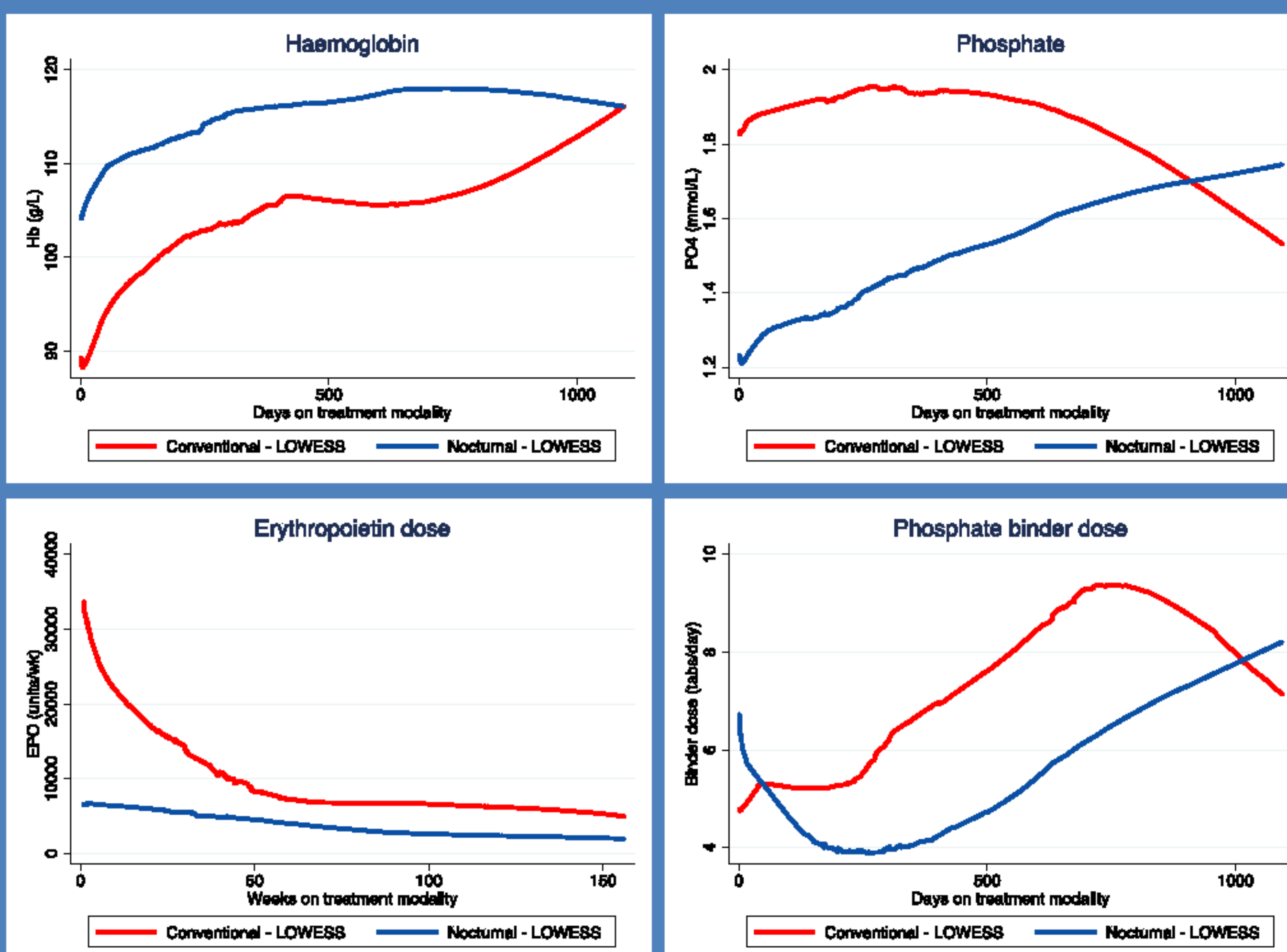
RESULTS



Patient	Sex	Age*	CICH (months)	NICH (months)	Reason for ceasing NICH
1	M	33	12.5	32	Transplant
2	M	51	7	6.5	Relocation
3	M	40	52	43	
4	F	59	42	10	Privacy
5	M	41	15	3	Relocation
6	M	59	96	35	
7	M	68	38	5	Sleep disturbance
8	M	74	2	18.5	
9	M	33	30	18	
10	M	44	9	14	
11	M	61	3	7.5	

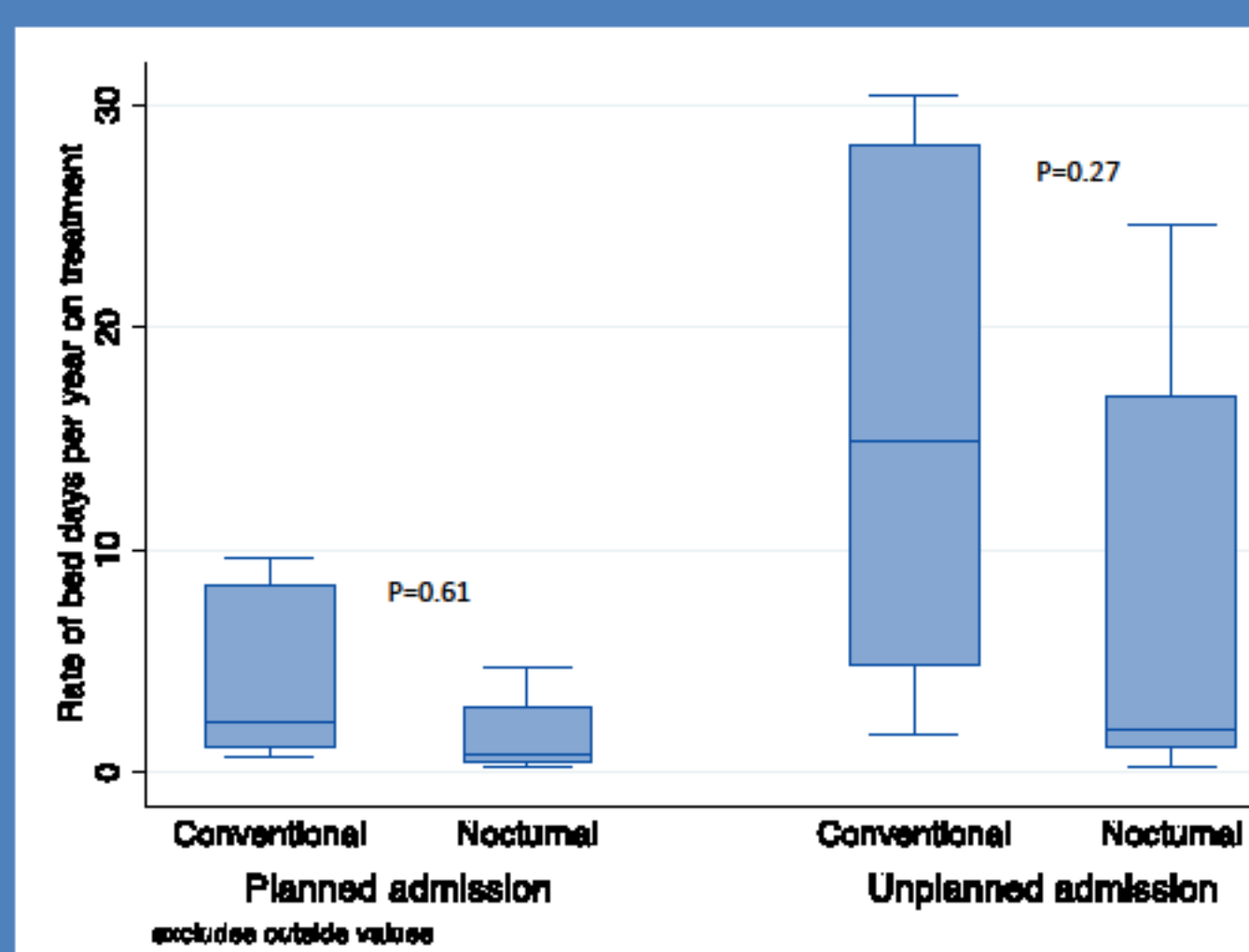
*at time of commencing NICH

Median age = 51 years (42, 62.5). Median time on CICH = 15 months (8.5, 55.5), on NICH = 14 months (8.5, 28.5).



PA mean PTH: 82.67 pg/mL lower on NICH (p=0.066)

There was a trend towards lower PTH on NICH. Both modalities exhibited a reverse J-curve pattern. One patient underwent parathyroidectomy (patient 6, while on CICH).



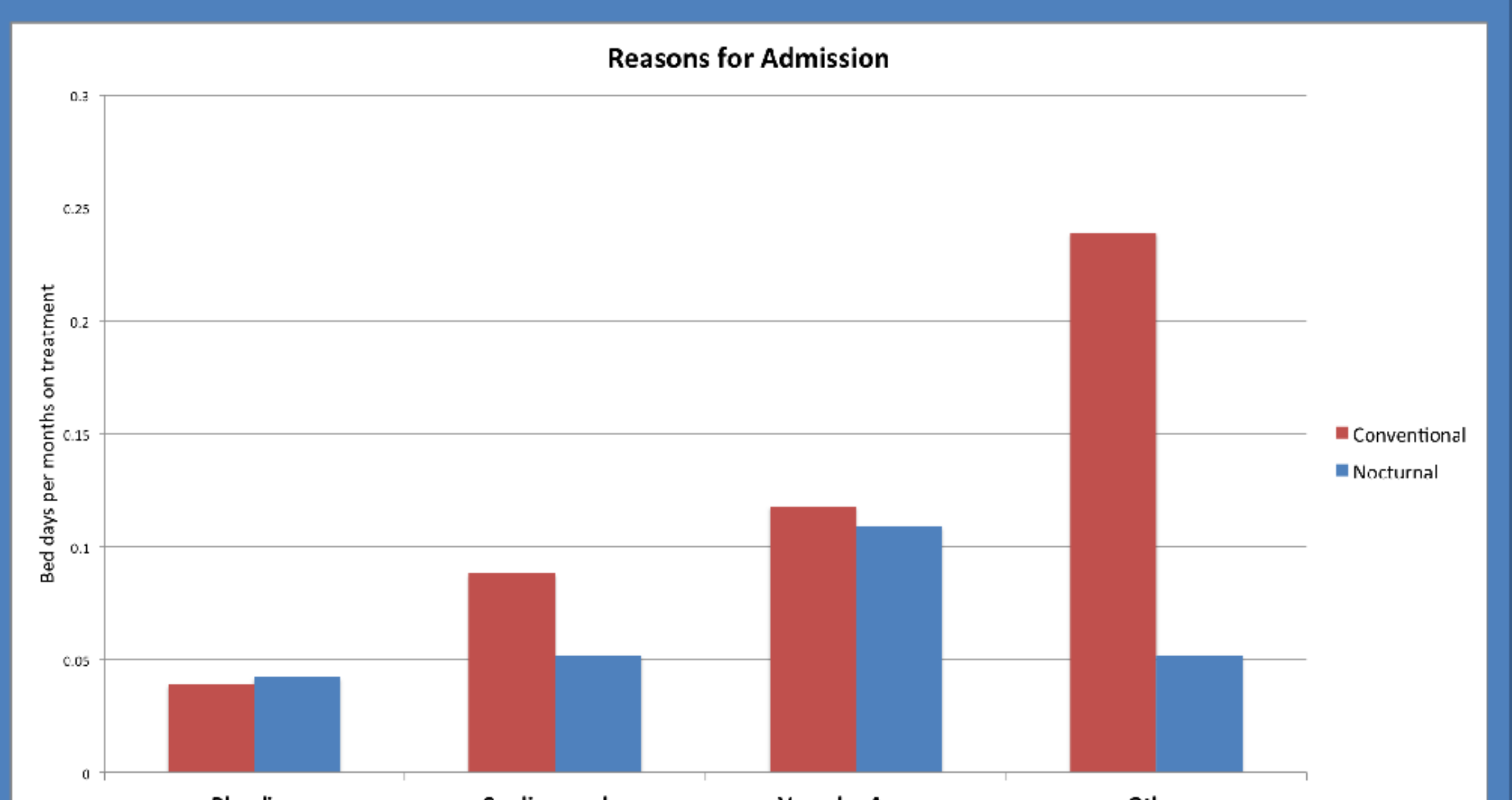
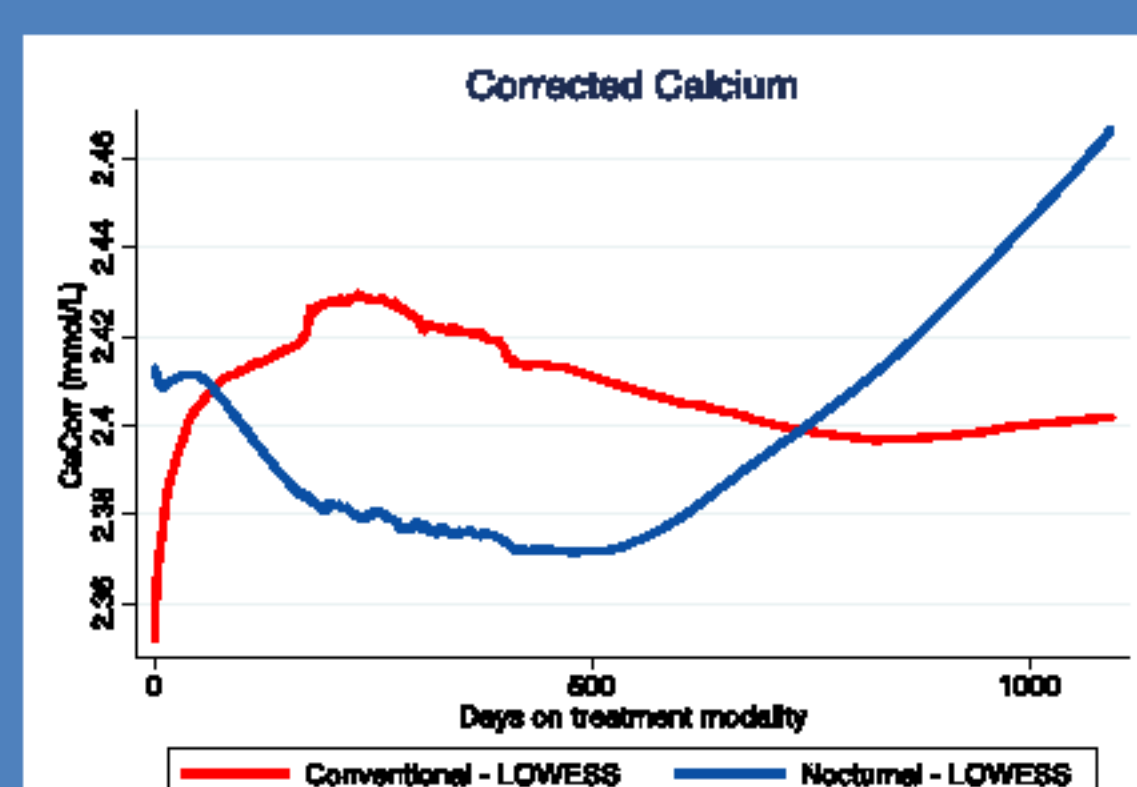
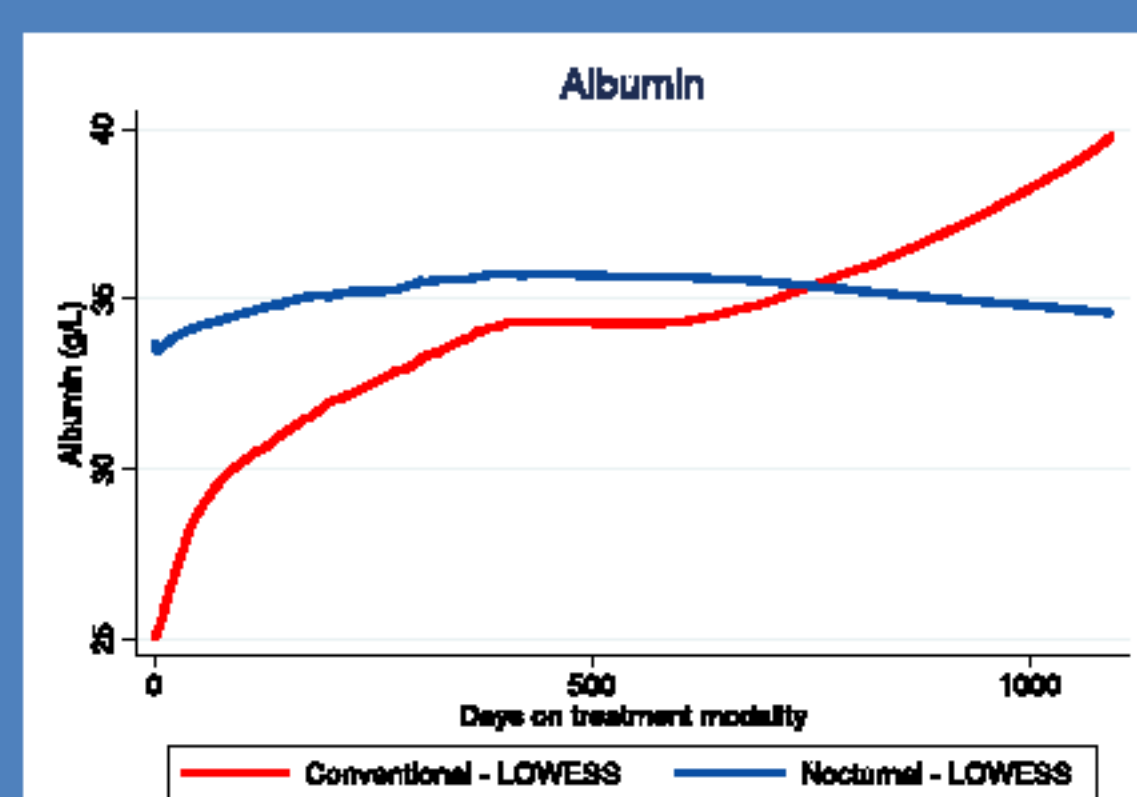
We hypothesised that time on NICH would be associated with fewer hospital admissions, especially unplanned admissions.

While bed day rates tended to be lower on NICH than CICH, particularly for unplanned admissions, this difference was not statistically significant in this small cohort.

Reasons for admission were further stratified into bleeding, cardiovascular (acute coronary syndrome, acute pulmonary oedema, hypertension, stroke), and vascular access (planned interventions and acute complications). Admissions categorised as 'other' included elective endoscopy/surgery, infection and trauma.

Differences between modalities were not statistically significant, however there was a trend to fewer bed days for vascular access problems and cardiovascular episodes on NICH, suggesting more clinical stability.

Predicted adjusted (PA) mean Hb: 10.71 g/L higher on NICH (p<0.001)
 PA mean EPO dose: 1132.13 units/wk lower on NICH (p=0.008)
 A clinically and statistically significant increase in haemoglobin was demonstrated on NICH, with an associated decrease in EPO dosage requirements, conferring health and cost benefits.
 PA mean PO4: 0.573 mmol/L lower on NICH (p<0.001)
 PA mean binder dose: 2.039 tabs/day lower on NICH (p<0.001)
 A clinically and statistically significant reduction in serum phosphate and phosphate-binder pill burden was observed on NICH.
 Frequent post-dialysis sampling during early phase NICH may have contributed to the apparent increase in serum phosphate over time on NICH.
 PA mean Ca: 0.017 mmol/L lower on NICH (p=0.176)
 PA mean Alb: 0.043 g/L lower on NICH (p=0.870) (Non-significant differences)



CONCLUSIONS

Our NICH program has been well received by patients and staff: only two patients have ceased nocturnal dialysis due to dissatisfaction with the modality. Patients in the NICH pilot program reported improved family and workforce engagement, and we intend to further evaluate quality of life in the growing program.

This analysis confirms that NICH also offers significant, measurable, clinical benefit, with improved biochemical markers and reduced medication burden.

Statistically significant differences in hospital admissions were not demonstrated. However, sub-stratification showed that, while on NICH, patients tended to have fewer unplanned admissions, and fewer bed days for syndromes associated with problematic or insufficient dialysis (vascular access complications and cardiovascular events).

Our Australian experience demonstrates that NICH is an effective form of extended-hours dialysis for patients unable to pursue home-based therapy.

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