

Expanded Hemodialysis and Inflammation Status Among Dialysis Patients

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Introduction and Objective

- There is a theoretical concern that expanded hemodialysis (HD) may allow backflow of small amounts of endotoxins from the dialysate into the blood, thus triggering low grade systemic inflammation.
- The neutrophil-to-lymphocyte ratio (NLR) is a reasonable surrogate marker for a patient’s overall inflammatory status and readily available in existing clinical data in the United States, unlike C-reactive protein (CRP), which is not.^{1,2}
- In the context of adoption of expanded HD, we tested whether NLR differs between patients receiving dialysis with a high-flux dialyzer (conventional HD), and those converting to expanded HD.

Methods

- We examined in-center hemodialysis patients at 33 clinics that converted from conventional dialysis to expanded HD in October-November 2025 and compared them to 30 similar, co-located clinics.
- We considered data from monthly standard of care laboratory values for the 6-month period beginning at expanded HD use or concurrently for controls.
- Levels were described as means, standard deviations, and formally compared using linear mixed models which were adjusted for age, sex, race, time since dialysis initiation, and baseline NLR.

Results

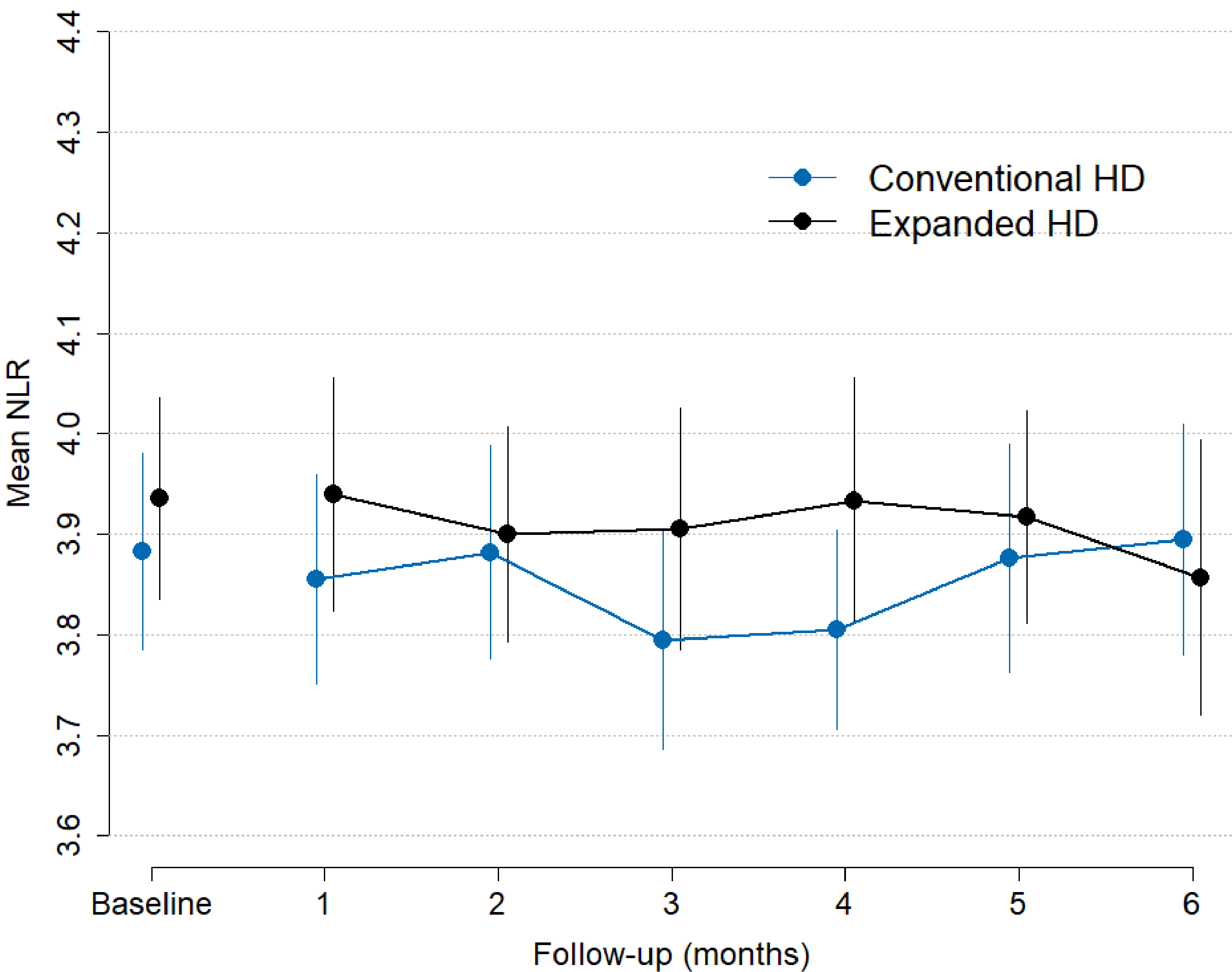
Table 1: Mean NLR over 6 months

	Conventional HD		Expanded HD	
	Mean	SE	Mean	SE
Baseline	3.88	0.0496	3.94	0.0512
Month 1	3.86	0.0531	3.94	0.0595
Month 2	3.88	0.0543	3.90	0.0546
Month 3	3.79	0.0557	3.91	0.0613
Month 4	3.80	0.0506	3.93	0.0622
Month 5	3.88	0.0581	3.92	0.0538
Month 6	3.89	0.0586	3.86	0.0697

Table 2: Mean NLR difference between groups

	Delta	95% CI		P-value
Overall	0.021	-1.939	1.981	0.613
Month 1	0.035	-0.072	0.143	0.520
Month 2	-0.000	-0.105	0.104	0.995
Month 3	0.003	-0.105	0.112	0.955
Month 4	0.021	-0.091	0.133	0.713
Month 5	0.084	-0.031	0.200	0.153
Month 6	-0.032	-0.165	0.100	0.631

Figure 1: Mean NLR over 6 months



- At baseline, mean NLR in the study cohort was 3.89 (standard deviation, 2.46) (Figure 1).
- Follow-up through June 2026 showed no difference in NLR between the conventional and expanded HD groups, either overall ($p>0.6$) or at monthly timepoints ($p>0.15$ for all) (Table 2).
- In the conventional HD group ($N=2,445$), mean monthly NLR ranged from 3.86-3.90 over 6 months. NLR levels dipped to 3.79 at month 3 but returned to 3.88 at month 5 (Figure 1, Table 1).
- In the expanded HD group ($N=2,280$), mean monthly NLR ranged from 3.94-3.86 over 6 months and remained relatively constant throughout the study period (Figure 1, Table 1).

Conclusions

These data do not support the hypothesis that expanded HD contributes to increased levels of systemic inflammation.

References & Acknowledgements

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