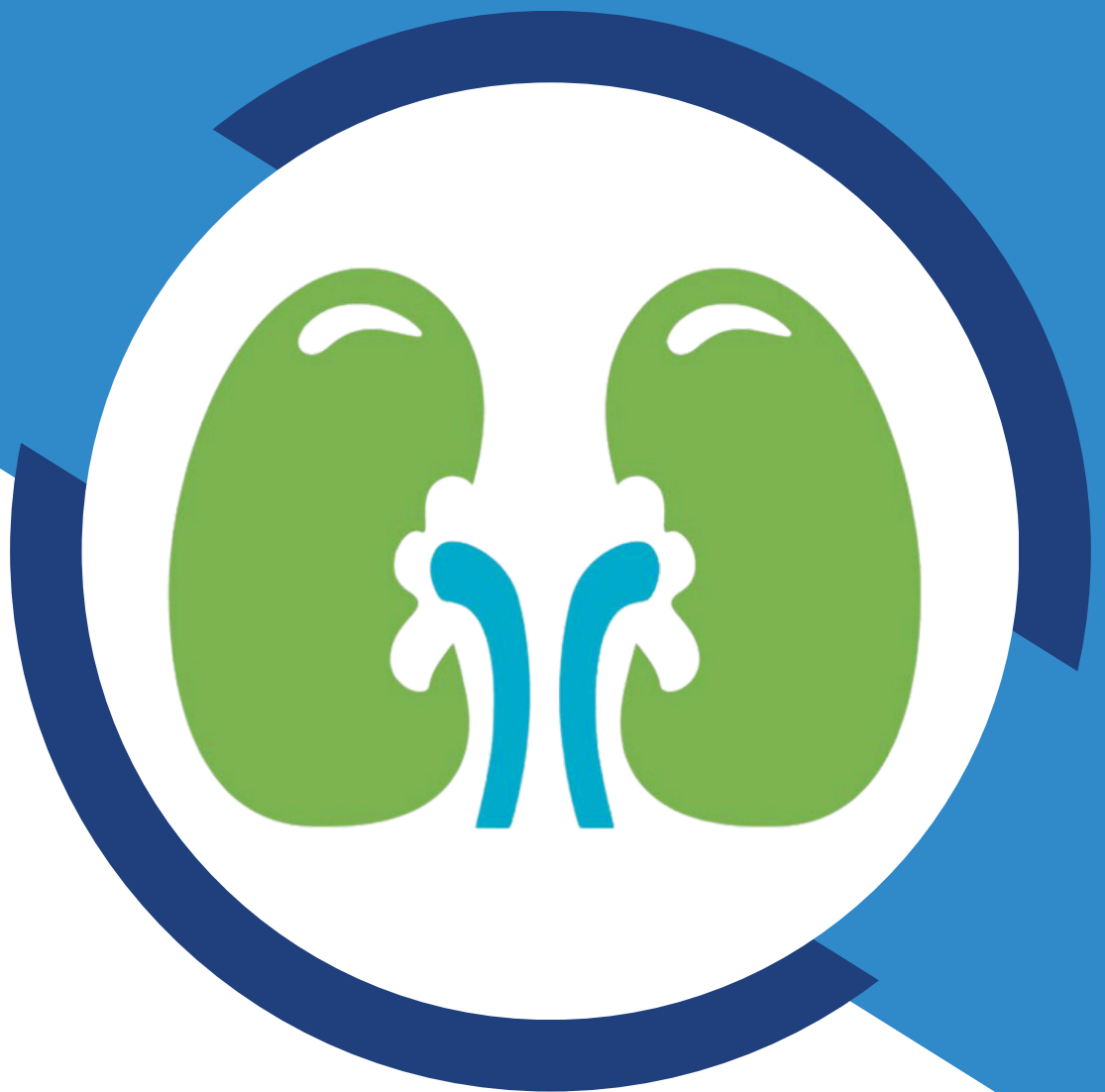


How-to Guide

Implementing the Switch
from 1:34 to 1:44 Dialysis
Acid Concentrate



Published in November 2025 by :



CENTRE *for*
SUSTAINABLE
HEALTHCARE
inspire • empower • transform

 **UKKA**
UK Kidney Association

How-to Guide: Implementing the Switch from 1:34 to 1:44 Dialysis Acid Concentrate

Project: Sustainable Kidney Care – Implementing Best Practice

Collaboration: UK Kidney Association and Centre for Sustainable Healthcare

Author: Centre for Sustainable Healthcare

Contributors:

- Gareth Murcutt - UCL Department of Renal Medicine, Royal Free Hospital London
- Eleanor Murray - Renal Consultant, QEUH, Glasgow
- Marta Arias - Renal Consultant, Hospital Clinic de Barcelona
- Suren Kanagasundaram - Renal Consultant, The Newcastle upon Tyne Hospitals NHS Foundation Trust

Although this guide has been developed by experts in sustainability and sustainable kidney care, local teams should use their discretion in its implementation according to local context and requirements

Introduction



Transitioning from a 1:34 to a 1:44 acid concentrate dilution in haemodialysis can reduce environmental impact without compromising patient care. Recent studies highlight the benefits of this change, including reduced packaging waste and lower greenhouse gas emissions [1].

Benefits of Switching to 1:44 Acid Concentrate



- **Reduced Packaging Waste:** Higher concentration requires less volume, leading to less packaging waste [2]
- **Lower Transport Emissions:** Decreased volume translates to less weight for deliveries, reducing carbon footprint [2][3]



- **Improved Storage Efficiency:** Less storage space needed due to reduced volume.
- **Reduced staff Manual Handling:** Each 1:44 cannister is approximately 1 kg lighter.



- **Cost Neutral:** Lower packaging and transport costs over time [4]
- **Clinical Equivalence:** No difference in patient outcomes when properly implemented and no initial start-up costs.

Step-by-Step Implementation Guide

Central acid delivery



The switch from 1:34 to 1:44 needs to be carefully planned with the renal technicians, the wider multi-professional team, and the Estates and Procurement departments as any acid concentrate preparations still delivered by canister (these are usually the less commonly used ones) will need to be switched at the same time.

Central acid delivery reconstituted from dry powder

Provided this is the main source of acid concentrates to the unit, we do not recommend that a conversion from 1:34 to 1:44 is made. Where 1:34 canister delivery still makes up a substantial (e.g. > 20%) proportion of the acid concentrate used, we suggest that the potential environmental and cost savings of a conversion are calculated to inform the decision to proceed.



Where acid concentrate is **wholly delivered by canister**, we strongly recommend that the conversion is made for a whole clinical area at a single point in time to minimise the patient safety risk.

We suggest a timeline for conversion as follows:

- 1 Ensure that your HD machine fleet in the target clinical area can be reconfigured to allow 1:44 dilution.
- 2 Estimate the time and staffing needed to undertake the re-configuration.
- 3 Take an inventory of weekly use of the full range of 1:34 acid concentrates to determine 1:44 concentrate requirements after the switch. This should include all preparations delivered by both canister and through central delivery.
- 4 Not every 1:34 concentrate has a direct 1:44 equivalent so check availability of 1:44 concentrates in the formulations required. If any concentrate changes are needed these need to be approved by medical and nursing leads and communicated in advance to their wider teams and renal technical staff.
- 5 Communicate your 1:44 requirements to your supplier(s) and agree a provisional date to switch and delivery dates for new stock. Where like-for-like conversion of acid concentrates cannot be undertaken, pause and discuss rationalisation of the suite of available acid concentrates, to include the clinical team.

Once the provisional date for the switch has been confirmed:

Ensure sufficient renal technical staff availability to convert the machine fleet for the target unit in one (non-dialysing) day – this will usually be a Sunday. If insufficient staff availability, this may require staggered conversions although this significantly increases risk and cannot be recommended without a robust and well-led risk mitigation plan.

Engage Stakeholders

Technical Staff

Verify compatibility of dialysis machines with 1:44 concentrate. We recommend workshop testing of new concentrates during dummy dialysis runs in advance of the switch, including sampling of dialysis fluid to verify electrolyte composition. It is also advisable to test that the HD machines with the new settings will no longer run up on 1:34 dilution concentrate for added reassurance (it is highly likely that machine tolerance will not allow this once 1:44 dilution has been programmed). If workshop testing is successful, and in conjunction with the wider MDT, develop a plan for the changeover, one unit at a time starting with a smaller unit.

Clinical Team

Discuss the patient safety implications of the switch from 1:34 to 1:44. Failing to change the dialysis machine settings can result in patient acid base and electrolyte imbalances.

Procurement

Inform suppliers of the intended switch, confirm the availability of 1:44 acid concentrate and negotiate a changeover date to allow completion of machine re-configuration and staff engagement before delivery of new stock as determined by the local inventory.

Staff Training

- **Educate:** Advise staff that the same process is required for handling and preparing 1:44 concentrate as for 1:34 concentrate.
- **Update Documentation:** Revise any relevant protocols or standard operating procedures to reflect the change.



Full Implementation

During the implementation project it is vital that all staff are aware of the need to physically separate the new and old concentrates. The plan must include the two dilutions being stored in different areas.

Conclusion



Switching to a 1:44 acid concentrate dilution is a practical step towards sustainable dialysis care. The transition promises environmental benefits and operational efficiencies, aligning with global efforts to reduce the carbon footprint of healthcare services [1-4].

References

[1] Jiménez MDA, Audije-Gil J, Martínez R, Martín Vaquero N, Gómez M, Portillo J, Pereda G, Gascueña DH, Duane B, Sanjuan M, Martín JLF, Dapena F, Ortiz A, Arias M. How to improve the environmental impact in haemodialysis: small actions, big changes. *Clin Kidney J*. 2024 Dec 20;18(2):sfae407. doi: 10.1093/ckj/sfae407. PMID: 39927256; PMCID: PMC11806634. <https://doi.org/10.1093/ckj/sfae407>

[2] Murcutt, G., Hillson, R., Goodlad, C., & Davenport, A. (2024). Reducing the carbon footprint for a 30-bed haemodialysis unit by changing the delivery of acid concentrate supplied by individual 5 L containers to a central delivery system. *Journal of Nephrology*, 37, 1949–1955. <https://link.springer.com/article/10.1007/s40620-024-02073-9>

[3] Cadenas RM, Audije-Gil J, Arenas MD, Vaquero NM, Portillo J, Larkin J, Fehintola A, Ortiz A, Duane B. Impact of the Type of Dialysate Acid Concentrate Container on the Environmental Footprint of Hemodialysis Centers. *Am J Kidney Dis*. 2025 Jul 28:S0272-6386(25)00965-5. <https://doi.org/10.1053/j.ajkd.2025.06.009>

[4] Choo S.M.Y, et al (2025). Sustainable health care in a renal centre - carbon saving is coupled with cost-efficiency. *Journal of Nephrology*. J Nephrol(2025). <https://doi.org/10.1007/s40620-025-02354-x>