Improving cost and clinical optimisation of Caffeine Citrate in infants with Apnoea of Prematurity

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Background and Introduction:

Caffeine Citrate is used in neonatal units for the treatment of Apnoea of Prematurity. This condition is defined as a pause in breathing, associated with bradycardia, pallor, and desaturation. It arises in premature infants and is attributed to the immaturity of the respiratory centre in the brain. Caffeine Citrate has been reliably shown to improve outcomes in premature infants including reduction in Chronic Lung Disease (CLD), earlier successful extubation, reduction in risk of Cerebral Palsy and reduction in neurodevelopmental impairment at 18 months[1,2].
While Caffeine is an important medication to use, it is relatively costly (expenditure in 2025 at Whittington Health was £4,869) and is a drug only ever used on neonatal units for this condition. With an update in the use of the drug, including stricter dosing regimen and cost-effective product purchasing, we aim to reduce the cost burden while still delivering clinical benefit to our patients.

The aim of this project is to harmonise the dosing regime for Caffeine Citrate across the Neonatal Intensive Care Unit (NICU) and Special Care Baby Unit (SCBU) at Whittington Health NHS Trust with those used at neighbouring neonatal units in North Central London (NCL), whilst also optimising cost-effectiveness of medication expenditure.

The project's objectives are as follows:

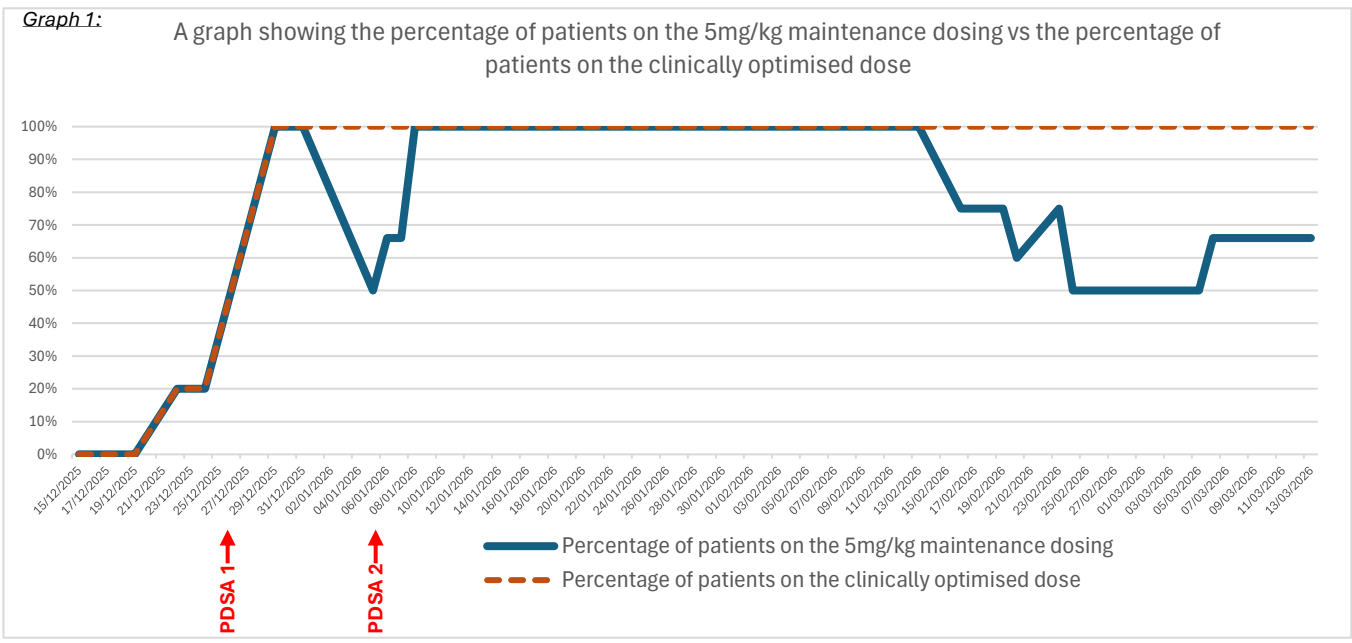
1) Initiate 100% of patients requiring Caffeine therapy on a maintenance dose of 5mg/kg daily, subject to adjustment based on clinical assessment and review.
2) Achieve a 25% reduction in the spend on Caffeine Citrate solution by the end of March 2026, compared with expenditure on the drug from the year prior.

Method:

- PDSA Cycle 1: Update the NICU Caffeine Citrate monograph to match BNFC and other NCL guidelines. Reducing daily dosing regimen aimed to align practice with local Trusts, while delivering therapeutic care and reducing risk of adverse effects. Daily audits were undertaken to track patient dosing, and therefore monograph utilisation.
- PDSA Cycle 2: Purchased a cheaper Caffeine Citrate product. By obtaining a Caffeine Citrate solution that is 20% cheaper than the previous product procured, expenditure should decrease, which was audited by undertaking year-to-date comparison of expenditure.
- PDSA Cycle 3: Introduction of "Caffeine Rounds"[3]. Vial sharing between patients reduces the number of vials used, reducing expenditure and waste. This will be measured by undertaking year-to-date comparison of distribution of drug via CMM.

Results, analysis and next steps :

Graph 1:

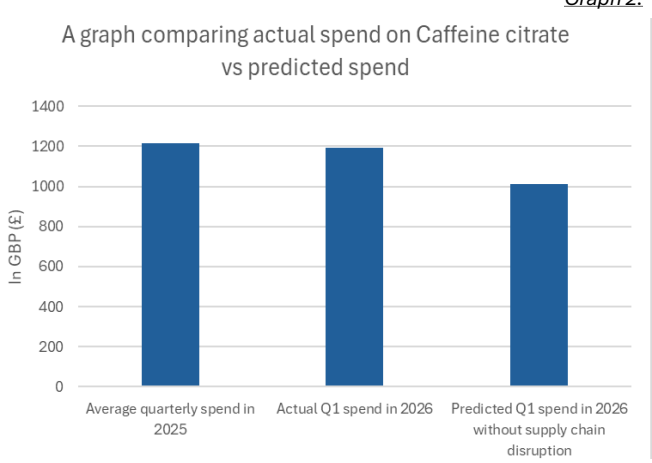


Publication of the updated drug monograph and communication to prescribers regarding the new dosing resulted in 100% of patients initiated on Caffeine received the lower maintenance dose (i.e. 5mg/kg). However, these patients were reviewed clinically and, if appropriate, increased the maintenance dose to 10mg/kg if indicated (i.e. those continuing to experience apnoeic episodes on the 5mg/kg regime).
In addition, there have been no reports of adverse clinical outcomes associated with the reduced dose. The monograph was reviewed after publication and feedback given by the medical team.
This feedback was then used to create a second version of the monograph, which is now in use on the neonatal units.

The average quarterly spend on Caffeine for 2025 was £1,217.25. Caffeine spend in the immediate quarter following PDSA cycles 1 and 2 was £1,195.20. This has resulted in only a 2% decrease in spend due to supply issues and delay in commencement of PDSA cycle 3.

PDSA Cycle 3 commenced in April 2026, with involvement from Stakeholders including ward nurses and registrars. Results of this intervention are yet to be collected or studied.

Graph 2:



Although larger cost savings were expected by this juncture in the QIP, they have not yet occurred due to delays in implementing PDSA cycle 3 and disruption to PDSA cycle 2. This is owing to staffing logistics and unavailability of the cheaper Caffeine product because of distribution issues, respectively. It has been calculated that without the issues surrounding obtaining the drug, spending would have dropped by 17% instead of 2%, even without implementation of PDSA cycle 3 (see graph 2). The project continues, and ongoing review after implementation of the next PDSA cycle will clarify its impact on costs and patient care.

References : 1. Abdel-Hady H, Nasef N, Shabaan A, Nour I. Caffeine therapy in preterm infants. World Journal of Clinical PeAdiatrics. 2015; 4(4):81-93.
2. Electronic Medicines Compendium. Summary of Product Characteristics (SmPC) - Caffeine Citrate 10mg/ml Oral Solution. https://www.medicines.org.uk/emc/product/5145/smpc [Accessed 23rd of February 2026].
3. Alrifai A, Machell J, Robertson F. Introduction of oral caffeine rounds on the Neonatal Unit. [Presentation] Nottingham University Hospitals NHS Trust. 2016.