

National Green Theatres Programme

Prògram Nàiseanta Lannsaireachd Uaine

Change peri-operative paracetamol from intravenous to oral

Opportunity for Change

Published: May 2023

An opportunity to save across NHS Scotland:



38
Tonnes of
CO₂e



£53,000

1. Description of action

- 1.1 It is intended to adopt a Once for Scotland approach, where oral paracetamol is administered in preference to intravenous paracetamol peri-operatively, unless contra-indicated.
- 1.2 This opportunity for change will evidence the financial and environmental benefits and provide supporting evidence of equal efficacy for patients.

2. Background

- 2.1 Administration of peri-operative intravenous paracetamol in preference to oral paracetamol is common in many hospitals despite equal efficacy, even when oral medication is not contra-indicated.
- 2.2 A review by Mallama et al.¹ found that the peri-operative route of paracetamol administration, intravenous vs. oral, did not affect pain or any other postoperative outcomes for patients.
- 2.3 Protocols to ensure all appropriate patients within NHS Scotland receive oral paracetamol peri-operatively have been in place for many years within some hospitals with an excellent safety and efficacy record, however this practice is not commonplace nationally.
- 2.4 There is a significant financial benefit in using oral paracetamol, where appropriate, in preference to intravenous paracetamol. One gram of oral paracetamol on average costs £0.03, compared with intravenous paracetamol at an average cost £0.59 per gram, more than nineteen times greater.
- 2.5 Based upon national prescribing data there is a potential green dividend of over £53,000 if use of intravenous paracetamol was reduced by 70%.
- 2.6 A recent publication has highlighted that there is also a substantially higher carbon footprint associated with intravenous paracetamol. The paper calculated the carbon dioxide emissions per gram of paracetamol from primary production materials and material disposal for

¹ Mallama, M., Valencia, A., Rijs, K., Rietdijk, W.J.R., Klimek, M. and Calvache, J.A. (2020). A systematic review and trial sequential analysis of intravenous vs. oral peri-operative paracetamol. *Anaesthesia*. doi:<https://doi.org/10.1111/anae.15163>.

paracetamol in glass bottles, plastic bottles and blister packs. It shows that through primary production material and material disposal, 1 g oral paracetamol generates just 1/68th of the emissions of intravenous paracetamol in glass bottles and 1/45th of the emissions compared with plastic bottles.²

2.7 By implementing this action a carbon saving of just under 38 tonnes across NHS Scotland, the equivalent of planting 1,287 trees would be achieved.³

3. Who needs to be involved in this change locally?

3.1 In order to implement this action it is recommended that the following groups should be consulted and involved:

- Anaesthetists
- Surgeons
- Theatre Staff / Managers
- Local Procurement staff
- Pharmacy Services

4. Boundaries

4.1 The table below identifies the boundaries for this action:

| In scope | Out of scope |
|--|---|
| <ul style="list-style-type: none"> • Peri-operative paracetamol exclusively • Patients who are fasting peri-operatively should still receive oral paracetamol • Reducing the purchasing of IV paracetamol | <ul style="list-style-type: none"> • Operations longer than 4-6 hours may require further doses of IV paracetamol • Patients where the oral route for medication is contra-indicated. • Allergy to paracetamol • Body weight <50kg |

² Myo, J., Pooley, S. and Brennan, F. (2021). Oral, in place of intravenous, paracetamol as the new normal for elective cases. *Anaesthesia*. doi:<https://doi.org/10.1111/anae.15482>.

³ <https://8billiontrees.com/carbon-offsets-credits/carbon-offset-tree-planting-calculator-find-how-many-trees-to-plant/>

| In scope | Out of scope |
|---|---|
| <ul style="list-style-type: none"> Once for Scotland approach is appropriate; the how to guide should not be diluted at board level. Elective surgeries | <ul style="list-style-type: none"> Patient taken paracetamol or a paracetamol containing product in the last 4 hours Non elective surgeries |

5. What is the change and how will it be implemented?

- 5.1 Greater use of oral paracetamol by nurse directive peri-operatively to reduce use of intravenous paracetamol intra-operatively. Sample Patient Group Directives (PGDs) should be adopted by all health boards.

6. What are the potential co-benefits of this change?

| Outcome | Potential Benefits |
|------------------|---|
| Carbon savings | 37.9 tonnes Co2e nationally, see appendix |
| Cost savings | £53,078.80 nationally, see appendix |
| Patient outcomes | Evidence suggests no impact on the patient |
| Staff experience | Consultations will need to take place within local nursing teams to ensure successful role out of patient group directives. |

7. Risks and Issues

- 7.1 As part of the development of this action a number of risk and issues have been identified below:

| Description of risk or issue | Mitigation / Action Plan |
|--|---|
| NHS Boards will not implement the action | A letter will be sent to the CfSD champion and non-executive sustainability leads to endorse the action |

| Description of risk or issue | Mitigation / Action Plan |
|---|---|
| | The action will be published and made available to the Chief Nurses and Pharmacists |
| Stock of oral paracetamol is not sufficient to support the change | Pharmacists will be involved in the roll out to ensure appropriate stock |
| Introduction of digital prescribing (HEPMA system) | Solutions are available but will have to be tested and rolled out at site level |

8. Implementation Guidance

- 8.1 The opportunity for change highlights the importance of implementing this action. This modification will help your site and NHS Scotland achieve net-zero emissions by 2040 as stated in NHS Scotland's Climate Emergency & Sustainability Strategy 2022-2026
- 8.2 Below the National Green Theatres Programme has provided guidance on how you can implement this change within your area. If you require any further information or guidance, please contact the National Green Theatres programme team on: cfsdgreentheatres@gjnh.scot.nhs.uk

Local Sustainability or Green Theatre Group:

| | |
|----|---|
| 1. | Review opportunity for change and validate what this means locally. |
| 2. | Provides National Green Theatre Programme Team with validated information/local targets. |
| 3. | Convene a discussion with the staff who need to implement it and those who are impacted by the action. |
| 4. | Understand what the opportunity is for implementing the action locally: work already undertaken and challenges. |
| 5. | Agree a local implementation plan. |



| | |
|----|---------------------------------------|
| 6. | Implement local plan. |
| 7. | Provide data as per measurement plan. |
| 8. | Monitor implementation of action. |

Appendix 1 – Measurement plan

| Name of measure (carbon, cost, staff experience and patient outcomes) | Type of measure (Outcome, Process, Balancing) | Concept being measured? | Where is the data available from? | Who is collecting the data? | Frequency of collection? |
|--|--|---|-----------------------------------|--|--------------------------|
| Carbon | Outcome | IV paracetamol use vs oral paracetamol use | National Procurement | Health Board collects their own data to be made available to CfSD. | Quarterly |
| Financial Savings | Outcome | Savings accrued from the change in practice | National Procurement | NHS Boards | Quarterly |
| Patient Experience | Outcome | Patient satisfaction and pushback | Verbal | Clinicians who then feed back to the SDG | Quarterly |
| Staff Experience and Engagement | Process | Staff pushback | Verbal | NHS Boards who then feedback to the SDG | Quarterly |

Appendix 2 – Potential Savings

| Cost savings | Tablet (in grams) | | IV (in grams) | | Tablet | IV | TOTAL |
|-------------------------------|---|---|------------------------------------|-------------------------------|-----------------------------------|---------------------------------------|--|
| | Current volume of tablet paracetamol ordered yearly | Predicted volume after the change adjusting for reduction in IV paracetamol use | Original volume of IV form ordered | Reducing solution (IV) by 70% | Increase spend in tablet form (£) | Decreased spend in IV paracetamol (£) | Total cost saving per health board (£) |
| Total for NHS Scotland | 12,848,038 | 13,087,036 | 341,425 | 102,428 | 7,169.93 | £60,248.72 | 53,078.80 |

| CARBON SAVING (t/Co2e) | Tablet | | | IV | | | TOTAL CARBON SAVING Tonne Co2e |
|------------------------|------------------------------|-----------------------------|-------------|------------------------------|-----------------------------|--------------|--------------------------------|
| Health Board | Carbon omitted before change | Carbon omitted after change | Increase | Carbon omitted before change | Carbon omitted after change | Decrease | |
| Total | 38.54 | 39.26 | 0.72 | 55.14 | 16.54 | 38.60 | 37.88 |

Basis of the calculations originate from figures generated from a paper published by Myo, Pooley and Brennan (2021): Oral, in place of intravenous, paracetamol as the new normal for elective cases. *Anaesthesia*. doi:<https://doi.org/10.1111/anae.15482>.

| | Cost (per gram) | Carbon (per gram) |
|-----------------------|-----------------|--|
| IV Paracetamol | 0.59p per gram | IV Paracetamol (average of glass & plastic) 0.1615 kg Co2e |
| Tablet | 0.03p per gram | Tablet paracetamol 0.003 kg Co2e |

