

The sustainable value of analgesics within the NHS: Could adoption of oral pre-operative analgesia reduce the need for IV analgesics?

Project Background:

Climate change has been defined by the World Health Organisation as the most substantial threat to human health in the 21st century.

Currently the NHS accounts for 25% of public sector carbon dioxide emissions in the UK and is coming under increasing pressure to reduce its environmental impact. The current NHS carbon footprint is 24.9 million tonnes CO₂e per year. The main contributors being medical equipment and pharmaceuticals and thus scrutinization of these areas to help deliver a net-zero NHS by 2050 has been of particular interest. Anesthetics specialty has the highest overall Greenhouse Gas (GHG) emissions in secondary care. The use of preoperative oral analgesia is being practiced more over recent years, however the traditional intraoperative IV analgesia is still the most popular method. Paracetamol is widely accepted as an effective analgesic worldwide based on its well established efficacy and tolerability, with recommendations for its use as first line analgesia established globally.

As pharmaceuticals are the largest GHG emitter within the NHS, and with paracetamol being the most clinically used analgesic, it represents an ideal target to determine the magnitude of GHG emission attributable to its different delivery formats.

Project Aims/Objectives:

Calculate per 1g paracetamol:

1: Carbon footprint- Published emission factors were applied to each of the specific data activity involved in the total LCA, with a single unit of measurement being calculated and compared, namely the carbon dioxide equivalent (kgCO₂e) per 1 gram of paracetamol.

2: Cost

3: Clinical efficacy

To enable the study to evaluate the 'sustainable value' of each preparation. Once results attained, see if this clinical change can be discussed and integrated into clinical practice within NHS pre-operative wards across Cardiff and further Wales nationally.

Project Approach:

To achieve the aims above Life-cycle assessment (LCA) was calculated from 'cradle to grave', applying the Inventory of Carbon & Energy database to attain the embodied carbon factor to enable a total kgCO₂e for each preparation. The study will adhere to the British Standards Institute Specification (BSIS) 9 through conducting a life cycle assessment (LCA).

Once data attained pre-operative teams were given a self reporting questionnaire. Likert scales were used to assess knowledge of this practice and also thought on the proposed change of oral use.

Discussion groups were organised to assess barriers to this clinical change, and how we could address them to enable a smooth transition.

Project Outcomes:

The IV preparation had the highest price per 1g of paracetamol at £11.20. Of significance was the substantial cost of suppositories at £11.04 per 1g, being the most expensive.

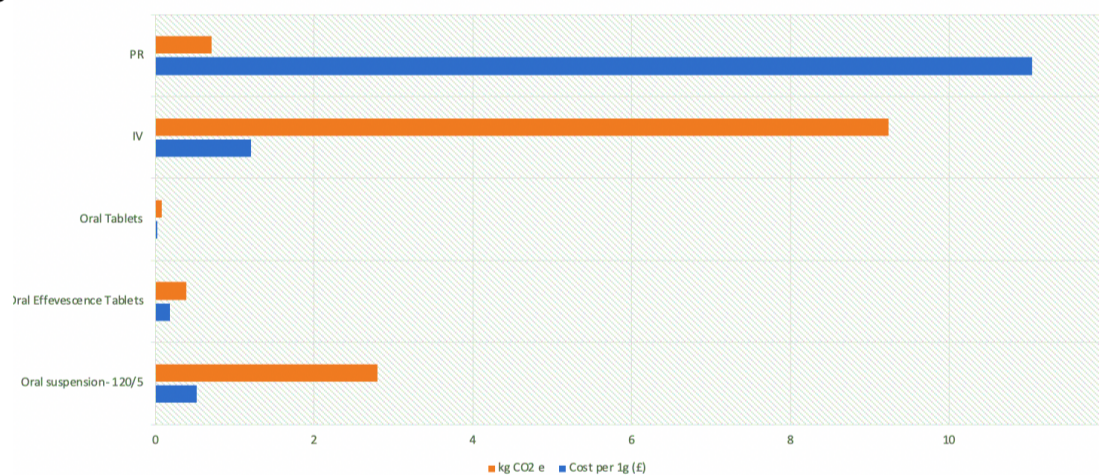
Overall this equated to 1g of IV paracetamol being x48 more expensive than oral.

IV preparation has a significantly higher total kgCO₂ at 9.23, oral suspension at 2.79, suppositories 0.71, effervescence at 0.39 and oral at 0.084 kgCO₂ per 1g of each preparation. This equated to IV having x110 fold increase in KgCO₂ in comparison to the oral tablet preparation.

Extrapolation of these result for the use of oral over IV paracetamol peri-operatively for the current Wales/ England yearly surgical total could yield a reduction of 42.8 million kgCO₂e per year. The government would have to plant 2.7 million trees to have the same effect (Kendall 2012), so over 4 years that's the same number as all the trees in Wales!

Clinical efficiency between all preparations were equivalent. 90% of anaesthetists were concerned about the impact of their clinical practice on the environment and already actively take measures to try and reduce this. Further the vast majority (85%) administer paracetamol IV intraoperatively but most (86%) would also consider changing their practice to prescribing oral paracetamol preoperatively.

Fig 7: Price and kgCO₂e per 1g of Paracetamol



Project Impact:

To instigate a clinical change from IV to oral paracetamol preoperatively, through creating the 'IMPROVE' project at Noah's ark -

Improving Paracetamol use with Routine Oral over Venous administration

Guidelines have been formatted for both doctors and nurses involved in pre-operative patients care:

Anesthetists

- 1. Prescribe Oral Paracetamol At Your Preoperative Visit (20mg/kg)
- 2. When prescribing routine post-op paracetamol include note "IV only if PO not possible"

Nurses

- 1. Weigh patients early
- 2. Anaesthetist to prescribe oral dose 20 mg/kg (paracetamol suspension 250mg/5ml or tablet as per weight)
- 3. Give ASAP on the ward
- 4. Tick box on admission board to indicate completion
- 5. Feel empowered to ask anaesthetist if they have forgotten

Key Conclusions:

With a substantial GHG emission and price difference in IV paracetamol over oral, the question surrounding the need for this preparation needs to be considered with lack of clinical superiority over its concurrent oral use. With the NHS striving for 'Net-Zero' GHG emissions, this contribution could bring this ambitious target a step closer, whilst reducing the NHS economic burden that pharmaceuticals confer.

The pre-operative team are opened minded to this change however did highlight challenges to this. This allowed us to develop solutions to these issues raised, which has lead to the IMPROVE project, being integrated into the pre-op proforma in Cardiff.

