Blue Gas Thinking:
Raising awareness of the environmental impact of nitrous oxide use in anaesthesia

Discussion and presentations within the anaesthetic department on the contribution of nitrous oxide and volatiles to global warming prompted me to look again at the figures. Nitrous oxide [in] anaesthetics… is a huge contribution to my own carbon footprint on the occasions that I use it. Since I can easily avoid it, I am happy to stop using nitrous oxide entirely.
Dr R Price, Consultant Anaesthetist

Anaesthetics Department
Dr Clare Swarbrick
Dr Pete Valentine
Dr Fiona Martin
Dr Pete Ford
Dr Alastair Martin

AIMS

- **To raise awareness of the impacts of anaesthetic use of nitrous oxide**
- **To introduce departmental monitoring of nitrous oxide use**
- **To reduce the use of nitrous oxide over the next 12 months**

APPROACH

- **Project choice:** 5% of the carbon footprint of acute NHS trusts comes from anaesthetic gases. Across the Trust 315 000L of nitrous oxide are used (not including Entonox), equivalent to 185 tonnes of carbon dioxide or 26 return flights from the UK to Sydney!
- **Measurement:** compared average order of nitrous oxide (litres per month) in 2019, which included the competition, with orders over the same period in 2018.
- **Engagement methods:** conversations with colleagues, an education session followed by a debate, reminder stickers on anaesthetic machines to encourage anaesthetists to use the minimum effective dose of anaesthetic.
- **Embedding:** regular monitoring and reporting of nitrous oxide use in the department, organised a training session on total intravenous anaesthesia (as a low carbon alternative to volatile gases).

EVIDENCE OF IMPACT

- **Raising awareness of the environmental impact of nitrous oxide:** *'I had not really thought of the environmental aspects of using it until we made a green team.' Fiona Martin, Consultant Anaesthetist*
- **Persuading some members of staff to use less nitrous** or to stop using nitrous in their practice.
- **27% reduction in the use of nitrous oxide** (Jan-July 2018 compared with 2019). It is expected that the raised awareness due to the campaign will increase the rate of reduction of nitrous oxide use at the Trust: *'I believe we could reduce the holding of nitrous oxide by 50% from all sites. I have come to this conclusion by the usage figures I have seen.' Marc Shaw, Pharmacy*

ANNUAL SAVINGS FORECAST

70,714 litres nitrous oxide
49,906 kgCO2e
£529

(not taking into account the potential savings of maintenance and manpower required)

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Plastic - not a trifling matter

Catering Team

Natalie Turney - Administration Team Leader

Shirley Jones - Catering Manager

Angela Jones - Patient Meals Service Team Leader

AIMS

- **To prevent plastic waste in hospital catering**
- **To decrease the carbon footprint of meals by introducing more vegetarian meals**

APPROACH

- ***Project choice:*** **200 plastic containers per day** were used to serve dessert portions to patients, **200,000 individual milk portions were used annually** at the Wonford, **plastic cups were available** beside the water cooler in the canteen. Vegetarian meals have a lower carbon footprint than those containing meat and form part of the daily recommended intake of vegetables required for a healthy diet.
- ***Measurement:*** **Baseline data gathered** on the number, cost, weight and delivery details of dessert containers, milk portions and plastic cups. **Data compared with** the **suggested alternatives** of using stainless steel containers (gastronorms) to make up desserts and china bowls for serving, large milk cartons and jugs and paper cups. The number of servings sold was measured when a second vegetarian hot food option was introduced on Mondays.
- ***Engagement methods:*** Comm Cells, the Patient Meals Service Team Leader liaised with the ward staff, poster campaign in the Oasis, updates posted on 'The Hub'. The initial consultation phase was followed by several improvement Plan, Do, Study, Act (PDSA) cycles where feedback was used to amend the project as it went forward.

EVIDENCE OF IMPACT

- **Carbon and cost savings** were achieved by eliminating or reducing single-use plastics used in desserts and milk containers. The number of deliveries were also reduced.
- On average, an extra 40 vegetarian meals were served each 'Veggie Monday'; these meals had a **lower carbon footprint** than meat alternatives, **saved money** and may be **more healthy**.
- **Social benefits included:**
  - **Reduced workload for catering staff:** it is easier to make up the desserts in the gastronorms. The admin team/storeman no longer have to order and store plastic pots weekly.
  - **Patient experience:** the weight of the bowl makes it easier for patients to eat their dessert and the quantity can be tailored to their appetite.
- Replacing plastic with paper cups did not overall reduce the carbon footprint or cost. Replacement with reusable cups would be better option.

ANNUAL SAVINGS FORECAST

Dessert pot and lid:

2,250 kgCO2e

£2,701

Milk containers:

1,240 kgCO2e

£4,537

Vegetarian menu option:

3,109 kgCO2e

£380

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Trashing Waste - *The Green Emergency Team*

Jo Webber, Consultant Emergency Physician, and Team

AIM

- **To reduce the carbon footprint of waste disposal from ED**

APPROACH

- **Project choice:** Clinical waste disposal has a higher carbon footprint than domestic waste it has to be incinerated at a higher temperature (more energy required). Moreover, RD&E clinical waste is not used as an energy source, unlike domestic waste. It is therefore environmentally important that domestic waste is not placed in the clinical waste stream. On a spot check of a clinical waste bag in ED 50% of the waste was inappropriate for the clinical waste stream, so increasing the carbon footprint of the department.
- **Measurement:** the team collected weights of clinical and domestic waste on 3 days; 2 days before the campaign and 1 day after the campaign. There was considerable variation in weight of bags in the pre-campaign phase. An assessment of the positioning of bins was also carried out.
- **Engagement methods:** a 5-minute educational "learning bite" outlining the importance of waste management at the RD&E in the context of the environmental crisis. 3 common waste items per day were chosen to highlight which bin should be used for disposal.

LEARNING POINTS

- **Bin positioning** is an important factor in determining which waste stream bin is used by staff.
- Separating waste is time-consuming; given that the department is very busy and many patients are critically unwell, it may be best to **focus on using the existing waste streams correctly** rather than introducing an extra waste stream for recycling.
- A project that **balanced benefits to staff and patients alongside environmental/cost benefits** may have made it easier to maintain staff engagement during busy periods.

SAVINGS FORECAST

703 kgCO2e

£211

per tonne

(assuming that inappropriate waste entering the clinical waste stream is completely eliminated)

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GO GREENER - recycling in the neonatal unit

Neonatal team
Tania Nightingale
and colleagues

AIM

- **To increase the number of medical items recycled on the neonatal unit**

e.g. plastic bottles used for storing breast & formula milk

APPROACH

- **Project choice:** following a switch from reusable clinical equipment that was sterilised, parents were asking staff why there was so much waste, especially of formula milk bottles, on the ward and no recycling facilities. For staff, this his highlighted the difference between their behaviour at home (where they would segregate waste for recycling) and at work. Tania ordered recycling bins for the unit and arranged for the waste team to attend the unit to educate staff on recycling clinical equipment.
- **Measurement: :** the weights of dry mixed recycling and clinical waste were measured after three shifts pre-project and five shifts post-project.
- **Engagement methods:** Comm Cell updates on the amount of recycling carried out, 'Quick Quizzes' to help staff understand which items could be recycled, 'Recycling Question Time' in collaboration with the waste team.

EVIDENCE OF IMPACT

- 3 more recycling bins were placed on the ward to support this project.
- The project was successful in engaging the team in considering how waste is disposed of in a clinical environment.
- The waste team showed the neonatal unit team that many more items than they supposed could be recycled.

LEARNING POINTS

- *Raised awareness that there are a high number recyclable items used in neonatal care*
- *Recycling bins introduced to give staff the opportunity to recycle at work*
- *Importance of collaborating with the waste team*

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Estates Department ask you to 'TRASH IT, DON'T FLUSH IT!'

Estates Department
Emma Harris

The nursing staff were shocked by the photographs that had been taken by trade staff showing blockages caused by clinical items that had inappropriately been disposed of in toilets and macerators. Seeing the photos motivated them to support the campaign in their clinical areas.

AIM

- **To reduce the number of blocked toilets and macerators at the Wonford site in both public and clinical areas**

APPROACH

- **Project choice:** 714 requests to unblock drains, toilets and macerators were made to estates at the Wonford site over January -July 2019, a 7-month period. This high level of blockages is in line with NHS trends. Many blockages are caused by wipes, which also contribute to microplastic pollution.
- **Measurement:** queries were run on the estates database, Backtraq, to gather baseline data on the work carried out by internal staff and external contractors. The queries were re-run to gather comparative data after a campaign had been run. Quotes were gathered from staff on the impact of blockages.
- **Engagement methods:** meetings with matrons, infection control leads and ward housekeepers, walkabout in hospital to engage staff ad hoc, poster campaign, collaboration with South West Water in a joint campaign.
- **Embedding:** recruiting ward champions to model good practise, regular messaging on Hub, Twitter and Comm Cells, extend poster campaign and refresh the existing campaign, ongoing collection and analysis of data related to blockages, introduce Datix reporting of blockages, contribute to the national consultation on wipes and blockages through the Royal College of Nursing.

EVIDENCE OF IMPACT

When comparing the average cost and carbon January-May (pre-and early campaign) and June (during campaign):

- **there was a 17% reduction** in requests to resolve blockages from 123 pre-and early campaign (with an average of 9 out-of-hours attendances) to 102 during campaign (5 out-of-hours attendances). Exjet visits slightly increased from 9 to 13 but costs decreased due to shorter time required to resolve these more minor blockages.
- The **carbon footprint** of the service **dropped by 35%**, saving 152 kgCO2e over 1 month.
- The **cost of resolving blockages dropped by 23%**, saving £1,205 over 1 month.
- Potential 'social' savings for staff and patients include; reduced risk of infection, improved patient dignity, reduced disruption for clinical staff, less sleep disturbance for estates staff.

ANNUAL SAVINGS FORECAST

1,824 kgCO2e

£14,460

(if trend continued over 1 year)

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Optimum inhalers for patients

Respiratory team

Dr Thomas Burden - Respiratory Consultant
Katy Converso - Respiratory Nurse Specialist
Belen Carballidoromero - Respiratory Pharmacist

"I never thought about the effect on the environment; I'd prefer an environmentally friendly option.

approximately 1/3 of patients wanted environmental factors to be considered when making an inhaler choice.

AIMS

- **To reduce the carbon footprint of inhaled therapies**
- **To increase correct inhaler disposal**

APPROACH

- **Project choice:** Metered dose (MDI or 'puffer') inhalers have a large carbon footprint as they use greenhouse gases as a propellant.
- **Engagement methods:**
  - Asking patients if they would like environmental impact to be considered when making shared decisions about which inhaler to use.
  - Using combined inhalers, rather than single-drug inhalers.
  - Switching from MDIs to dry-powdered inhalers (DPIs), that do not contain greenhouse gases.
  - Advising patients to return their used inhalers to pharmacies for incineration or directed toward their nearest recycling scheme rather than putting them in the bin at home. This stops residual greenhouse gases escaping into the atmosphere.
- **Measurement:** Data was collected on the number of device switches made, the devices used before and after the switch, the number of patients informed to return used inhalers to pharmacy. Patient comments were also recorded during consultations where the environmental impact of inhalers was introduced.
- **Embedding:** 2 DPIs added to the formulary so that prescribers have more environmentally - friendly prescribing options. Assessment of optimum inhaler device for patients and recommendations changed on the COPD bundle checklist to reflect broader options.

EVIDENCE OF IMPACT

- Approximately **1/3 patients wanted environmental factors to be considered** when making an inhaler choice.
- Approximately **20 inhaler switches were made over 10 weeks**, an average of 2 switches a week, to lower carbon options, without increasing cost.
- Appropriate disposal: approximately **30 patients** were advised to **return their used inhalers to pharmacies** for safe disposal.

ANNUAL SAVINGS FORECAST

2,153 kgCO2e

£466

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