WINTER 2020

SEA-G NEWSLETTER

Scottish Environmental Anaesthesia Group

Welcome to our first edition

EDITOR'S WELCOME
BY SAM FREEMAN

The scope and extent of sustainability projects across NHS Scotland gives the impression of a revolution. But for a revolution to work, affecting the whole workforce, we need to spread our ideas and publicly celebrate our successes. We're excited to bring you this first edition of our quarterly newsletter that will hopefully find its way past all spam filters and nhs.scot mail merger catastrophes, and allow us to build on what is already a massive momentum of change.

This first issue is packed with inspiring projects from all over Scotland, so read on dear comrades. Viva la revolution.

This issue:

Countdown to COP26

BY LISA MANCHANDA
NHS GREATER GLASGOW AND CLYDE

In November 2021 the 26th United Nations Climate Conference (COP26) will be held in Glasgow. From the 1st to the 12th of November leaders of UN Nation states will meet in the Blue Zone at the SEC Centre beside the River Clyde. Their aim is to accelerate action towards the Paris Agreement and the UN Framework Convention on Climate Change. They have described 5 campaigns for COP26 – Adaptation and Resilience, Nature, Energy Transition, Clean Road Transport and Finance (www.ukcop26.org)

UN CLIMATE CHANGE CONFERENCE UK 2021

IN PARTNERSHIP WITH ITALY

On the other side of the river there will be a Green Zone based at the Glasgow Science Centre where there will be an opportunity for other groups such as representatives of observer organisations or those exhibiting or hosting an event to take part in some way. In addition, the 4th Global Conference on Health and Climate Change (organised by WHO) will be held on the 6th and 7th of November at Glasgow Caledonian University. The Centre for Climate Justice is based at this institution and undertakes research on climate issues and social change (www.gcu.ac.uk/climatejustice/). There is widespread recognition that the health of people and the environment are closely connected. Climate change is one of the greatest threats to public health in the 21st century. Members of the SEA group hope to be able to attend this event.

Glasgow City Council declared a Climate Emergency in May 2019. They published a report with over 60 recommendations that is considered a pathway to a carbon neutral city by 2030. Next year they will launch a new transport strategy, active travel strategy and liveable neighbourhoods strategy.

"Adaptation and Resilience, Nature, Energy Transition, Clean Road Transport and Finance."

5 CAMPAIGNS OF COP26

We have engaged with them and hope to work together on local projects to improve active transport for staff and patients travelling to our hospitals. The SEA group plan to work together with the local organising committee of COP26 from Glasgow City Council to showcase work that has been achieved in Scottish Health Boards over the last few years. We are aiming to achieve specific targets within the Greater Glasgow and Clyde
Health Board by working with their Sustainability Team. The action plan termed the "Countdown to COP26" will include improved waste management, reducing energy consumption, sustainable procurement, clean transport and green theatre projects amongst other work. The Health Board have recently set up a Sustainability Governance Group which will include a Clinical Lead.

We have named this journey the "Countdown to COP26" to enable us to have a targeted timeline to achieve demonstrable sustainable changes within our health service.

Find out more:
www.ukcop26.org

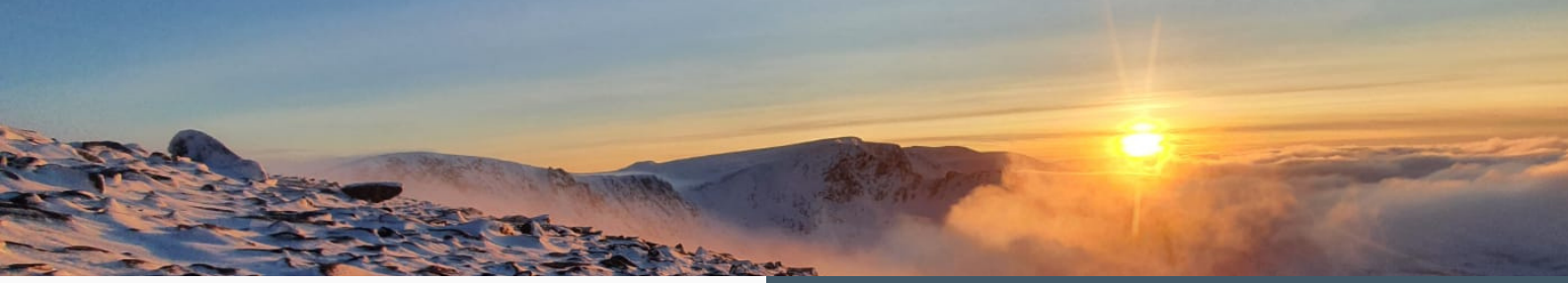
"If this system was leaking at a rate of 1 litre per minute, then over the course of 30 days that would leak 43,200 litres of nitrous oxide"

The Manifold Problems of Nitrous Oxide

BY ANDREW GRANT
NHS LOTHIAN

Nitrous oxide accounts for at least 80% of the emissions associated with anaesthetic gases, however it has proven difficult to identify strategies to reduce its use. Alifia Chakira, a pioneering pharmacist in NHS Lothian, decided therefore to go to the source of the problem in the hospital – the manifold. In the first hospital visited she identified significant issues with poor stock rotation, leading to size J cylinders breaching their use by date and needing to be returned to the manufacturers, where they are vented to the atmosphere. There were 2 manifolds on this site, but she was able to identify that one was no longer required due to changes to the services the hospital was offering. Improvements here are projected to potentially reduce the nitrous oxide carbon footprint by 98%.

This project was therefore repeated at a second hospital, the Royal Infirmary of Edinburgh, which has 2 nitrous oxide and 1 entonox manifolds. Manifold management and stock rotation was excellent. A logbook recorded every time the bank of cylinders were changed over – this allows calculation of the volume of nitrous leaving each manifold. The distribution of each manifold was identified. Our initial work has focussed on the "phase 2" manifold, which does not supply maternity: logbook data, backed up by pharmacy records of nitrous cylinders purchased, found that roughly 65,000 litres per month of nitrous oxide was leaving the manifold. This was delivered to general theatres, recovery, the emergency department and various areas in radiology and CCU.



Our intial thought was that this seemed very high: we therefore sought to quantify how much nitrous is used clinically. We did this in a number of ways.

1) Contacted recovery, CCU and radiology to confirm that nitrous was only present for use by anaesthetists, not by their own departments.

2) Spoke with ED, confirmed that they do occasionally use high-flow 70% nitrous oxide in oxygen for sedation for orthopaedic relocations. Identified all patients admitted to ED area with manifold nitrous supply for one month and reviewed online records to work out which patients potentially received nitrous. Documentation is not always that thorough, so we opted to always pick the highest reasonable estimate of nitrous oxide use so that we could be confident the real usage was somewhere below our calculated
usage.

3) Performed a snapshot audit of theatre activity over a week, asking the list anaesthetist how they had managed each patient. This found 5 uses of nitrous oxide out of 285 cases.

4) Our new anaesthetic machines keep a log of all gases used, so it is possible to interrogate the machine and find out the exact volumes used for the 3 previous cases. Through this, we were able to
calculate the exact volume of nitrous oxide used in the theatres supplied by the manifold in question over a 7 day period.

5) Survey of anaesthetists, asking where they use nitrous oxide and how often.

The overall picture this painted was that, outside of maternity, nitrous oxide use was very low amongst anaesthetists, with many never using it. Of note, this hospital currently has no paediatric patients.

Total estimated monthly clinical usage of nitrous oxide was 7400 litres a month, leaving an unaccounted volume of about 57,600 litres per month which leaves the manifold. It is thought that this most likely reflects a leak in the pipework. For context, the manifold and pipes are 20 years old, have never been tested for leaks and the manifold is situated in the car park. The pipes travel under the road then behind the walls, branching to supply 95 outlets. If this system was leaking at a rate of 1 litre per minute, then over the course of 30 days that would leak 43,200 litres of nitrous oxide.

This total annual carbon footprint of the unaccounted, waste nitrous oxide is approximately 387 tonnes of CO_2 – equivalent to 240 return flights from London to New York. This therefore represents the potential savings from shutting the manifold down.

This data has been presented to the consultants meeting. A plan is being developed to try and close the manifold, which is likely to involve the availability of a small number of size E cylinders which can be plugged into the anaesthetic machine for cases where nitrous oxide is thought to be essential.

Find out more at a free online webinar. Details on page 12

Anything we can do, you can do better

BY EWAN JACK
NHS FORTH VALLEY

If ideas have been successful elsewhere, they're likely to be successful for your department too. There is no point reinventing the wheel, so try these ideas out and tell us how you've got on.

Here within the theatre department at Forth Valley Royal Hospital we have made significant environmental progress over the past few years, all of which are potentially replicable across the country. Here is what we have changed so far:

- We have stopped using Desflurane (one bottle used in the last 22 months)
- We have reduced the default flow rates for our anaesthetic machines (from six L/min to three L/min)
- Our anaesthetic machine ventilator drive gas is now driven by medical air (three times less CO2 impact in it's production than oxygen)
- We encourage TIVA, providing two TIVA pumps per theatre
- Regional anaesthesia workshops are run by our local experts, reducing the proportion of GAs (during first phase of Covid-19 pandemic more than 38% of theatre cases were non GA)
- We segregate all of our cardboard waste
- We segregate all of our non clinical waste into clear bags
- We separately collect all batteries, printer ink systems, non clinical glass and metal

"We, as end users, have an excellent degree of knowledge and ownership of these issues"

We have reduced the amount of packaging for our most common surgical procedures so there is now one large pack to open rather than 38 smaller individual packs (saving significant nursing time as well as reducing mistakes of missing a piece as well as less wrappings). We are about to start segregating our electrical surgical instruments – e.g. Harmonic scalpels and send them for re manufacture – this should add another small income stream to the organisation as well as reducing costs.

All of this is relatively easy to do on site. We, as end users and 'coal face workers' have an excellent degree of ownership and knowledge of these issues, but where we can see even bigger benefits in is influencing the wider organisation.

Influencing the wider organisation...

Each board is obliged to submit a sustainability plan to the Scottish Government, and we should be involved. For example, it has been very reassuring to see that Forth Valley NHS has reduced our carbon footprint by some 30% since 2014, we have also reduced our energy consumption by 8% from 2018 and have in plan the total replacement of our small and medium sized transport fleet (135 vehicles) with electric vehicles by 2025.

We now undertake several departmental outpatient clinics remotely including Haematology, Neurology, Dermatology and Pain. Indeed some 22.6% of all out patient appointments are no longer face to face (saving over 1000 patient journeys per month). We are also aiming to have some 20% of our elective pre op assessment done online saving another 3000 patient journeys per year. With a population spread over a significant area our average travel is 9.3 miles but some come from as far as 60 miles. We calculate some 225,000 km of car travel avoided. We now have some 700 staff (out of over 8000) mostly working from home We are installing 16 car charging points for public use and support eBikes for staff. Every business plan submitted now has a sustainability section.

Go ahead and approach your board. Here are some questions to get the conversation going:

Why are all of our lights not LED?

How many clinics are still face to face?

How do we heat our buildings?

When will we get rid of our fossil fuelled cars and vans?

Have we examined the procurement chain for environmental impact?

How do we support active travel to work?

Do business cases take environmental impact into consideration?

How many electric charging points are we installing?

The more we ask the questions the higher up the agenda these things become.

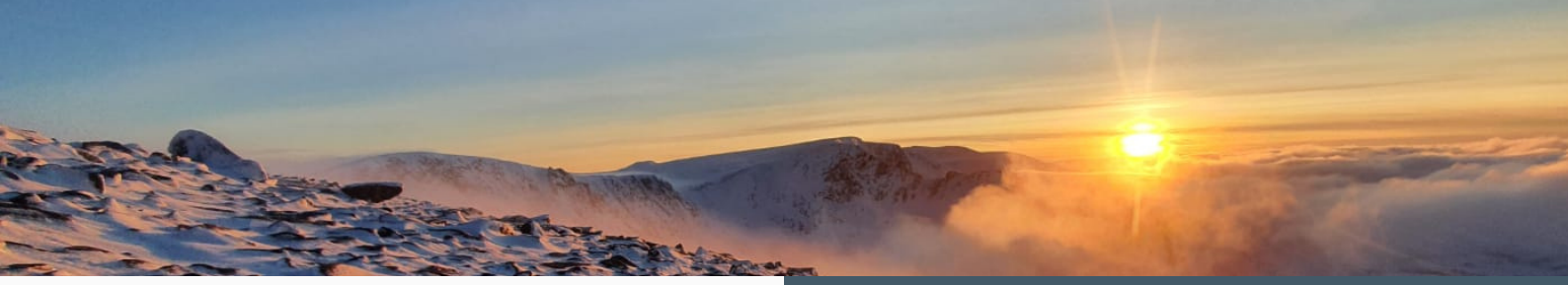
"Each operating theatre produces approximately 2300kg of anaesthetic waste"

Waste Recycling

BY PAVAN RAJU
NHS TAYSIDE

Waste generation is inevitable and has a negative economic and environmental impact. However, minimising production, appropriate segregation and efficient management of waste can reduce this impact. Each operating theatre produces approximately 2300kg of anaesthetic waste (and another 230kg of sharp wastes) a year. Following the strategy of waste hierarchy (see figure to the left) can result in significant improvement in overall management of waste.

My colleagues (Dr T Smith, Consultant Anaesthetist and Dr E Stevenson, Public Health Registrar) organise a 4-week student selected component (SSC) in environmental sustainability for year 2 & 3 medical students. As a part of this, the students undertook a quality improvement project in theatre waste management. The main aim was to explore the barriers to segregating waste and recycle in theatre areas (including kitchen areas). Observation of waste management was carried out before and after a promotional campaign (see following page). Various ways were used to promote appropriate waste management after an initial observation followed by informal staff interviews. Some of the important responses including perceived barriers are highlighted at the bottom of this article. Based on staff responses and initial observation results, students made recommendations on waste segregation and labelling and location of bins to ensure ease of access. This resulted in positive changes to waste management in our department.



Doing our bit for the planet...

Making our operating theatres more environmentally friendly **Jan 2018**

The NHS:
-Produces **4%** of all UK waste
-Produces **3%** of all UK CO_2 emissions
-Could save **£180 million annually** by reducing CO_2 emissions

One third of all NHS clinical waste comes from peri-operative areas

Each operating theatre:
-Produces **~2300kg/year** anaesthetic waste
-Produces **~230kg/year** sharps waste

Correct disposal of waste with increased recycling would significantly reduce costs and environmental impact.
Most of us do this at home already and we can also do it at work.

	Disposal cost (per tonne)	What can go in?	Where does it end up?
	**£467**	Any soiled non-sharp e.g. gloves, gowns, swabs	Incineration
	**£467**	Sharps e.g. needles, scalpels, empty glass vials	Incineration
	**£115**	Everything else e.g. packaging, paper towels	Sorted, some recycled (7%). **Rest shredded, baled & sent abroad as fuel**
	£0	Cardboard e.g. empty drug boxes	**Recycled**

Although the duration of project was short and limited to one area, it highlighted the staff engagement and desire to implement interventions making a positive impact.

The main conclusions of this project

- Simple interventions can make a difference
- Highlighting the problem canchange attitudes
- It has economical, health and environmental benefits

Acknowledgement – SSC students of May 2018, Staff of Main theatre Suite, Ninewells Hospital and Drs T Smith and E
Stevenson.

Perceived barriers to effective waste disposal, from the survey....

Lack of appropriate bins

Mentality within the department

Labels for waste segregation

Education

Time

Creating enough space

Infection control

Fire hazard

Obligatory packaging waste

Scavenging Technology

BY SARAH CROSS
NHS LOTHIAN

The Scottish Government has set a legally binding target of net-zero greenhouse gas emissions by 2045 at the latest, aiming to become carbon neutral by 2040. Anaesthetic gases are direct emissions and as such, they are targeted for 'absolute zero' emission rather than 'net zero'. NHS Lothian anaesthetists have gradually reduced their volatile footprint by half over the last 5 years with changes in clinical practice. In the last year we have started using a new generation of anaesthetic machines with further efficiencies. The next step to achieving absolute zero emissions will be introducing volatile capture technology.

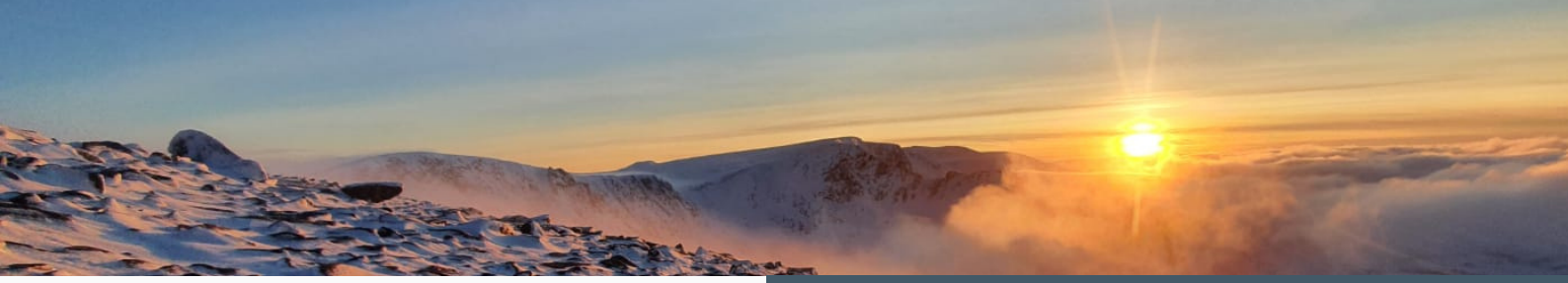
There are 2 companies with this technology in Europe, Baxter (working with Zeosys in Germany) and Sagetech (in the UK). After many virtual meetings and hours of consultation with Management, Medical Physics, Equipment Committees and Pharmacy, we are hoping to pilot both of them in Lothian and are about to start the pilot with Baxter. We will be collecting volatile from the machine exhaust into a canister in passive scavenging mode. There is a sensor that detects the canister filling so that it can be changed over when full. The canisters will be collected by Baxter and returned to Zeosys in Germany. Once regulatory approval is granted, the captured gas can be separated and sterilised for future use as a new activated pharmaceutical ingredient. Hopefully we will be the first site in the UK to be able to recycle our volatiles!

"The next step to achieving absolute zero emissions..."

Sagetech have already piloted canister collection of volatile in Newcastle and are hoping to install their extraction machine on our site as the next phase of their development. This way the canisters can be emptied and returned to use on site while the extraction machine only needs to be emptied every few months.

We are all excited to be involved in these projects and hope that this technology will be able to be rolled out across the speciality. More on this to follow.

Example of volatile capture in action



Winter Scientific Meeting

Book your place on the Association of Anaesthesia website for this year's Winter Scientific Meeting, a forum that has increasingly featured healthcare sustainability high up on the agenda

Follow on Twitter

Don't forget to follow SEA-G on twitter for more news and updates

@GreenAnaesScot

Announcements, Events and Updates

Free online webinar

Hosted by the Centre for Sustainable Healthcare, a free online seminar by Alifia Chakera and Chris Allen on reducing nitrous oxide waste, lunchtime on 15th January 2021

sustainablehealthcare.org.uk

Get involved for the Spring edition

This newsletter is a collaborative project written by, and written for, all involved in theatre sustainability across Scotland.

If you've got a project or idea that you'd like to write about for the next edition, or you'd like to be involved in editing, then get in touch by email: samuel.freeman4@nhs.scot

SEA-G Website

If you have any ideas for content (such as examples of good practice or or things we can do to promote environmental anaesthesia) or would like to be involved with the website for SEA-G, please contact Calum McDonald calum.mcdonald2@nhs.scot