

PROJECT TITLE:

Who Needs Spray Anyway? RBH Recovery's Stamp On Improving The Environment

TEAM MEMBERS:

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Background:

- **Reasons for choosing this project:**

Ethyl Chloride is a local anaesthetic spray that in the Royal Bournemouth Hospital trust is used only to provide a sensory cold sensation to check spinal and epidural anaesthesia blocks. It is an active substance also called chloroethane, C₂H₅Cl. The brand we use is called Axongesic distributed by Ennogen Healthcare based in the UK. It is manufactured by BTC Invest in the Czech Republic (Ennogen 2018). Each aerosol contains 100mls of liquid Ethyl Chloride only - there is no propellant added.

Being a centre for elective orthopaedic surgery, the use of Ethyl Chloride is substantial following the administration of spinal anaesthetic for hip and knee replacements. In the trust there are 5 theatres that use this type of anaesthesia on a daily basis. It is also used frequently for major gynaecological surgery and for those patients with co-morbidities which make general anaesthesia a high risk.

We originally identified a need to make an environmental change to reduce the use of ethyl chloride in recovery when a bag of 60+ cans was taken to pharmacy for disposal, to be told that pharmacy dispose of them in the black domestic waste not through any other channels. In view of this the staff member then took the cans home to put them in their home recycling bin to avoid them being thrown away.

- **What is the problem?**

The problem is that a large volume of cans are being utilised at great cost to the hospital and environment. Could we find a more sustainable option that gave the same clinical results?

- **Why is it important?**

The Ethyl Chloride spray is inhaled by patients and staff when testing the patients block level (a spray on the skin) which can be irritating to the eyes and lungs (Npi.gov.au, 2019). Ethyl chloride can induce allergic reactions to the skin for some patients and frost bite when used excessively (Ennogen 2018). Exposure to high levels of ethyl chloride has been shown to result in temporary feelings of drunkenness, dizziness and lack of muscle coordination (USA, EPA, 2019).

The cans are costly at £17.94 per can and are generally empty after only a few uses. As they are being used very frequently after spinal anaesthesia the cost of these sprays is significant.

Once used, the spray is released into the environment and remains in the atmosphere for 1 to 2 months before it breaks down. It is acutely toxic to birds, animals and aquatic life and affects the growth rate of plants (Npi.gov.au.2019)

Ethyl Chloride spray has an impact on the environment; there is a carbon footprint for the cans that are being transported from the Czech Republic 1,242km by truck to Ennogen Healthcare,

a distributor in Dartford, UK. The cans are then transported by truck from Dartford to Royal Bournemouth Hospital, taking another 198km.

Transport	km
Czech Republic to Ennogen in Dartford UK	1,242
Ennogen in Dartford UK to Royal Bournemouth	198
Total	1,440

The cans can be recycled by the trust weighing 39 grams each empty. The hospital recycling costs are £50 per tonne, a cost that could be significantly reduced by minimising (or eliminating) the number of cans used.

GhG Emissions factors

GHG emissions Factors	GHG (KgCo2e)	Freighting goods	Wtt – Freighting goods	Cost £
Freighting goods (per tonne.km)	0.13667	0.11021	0.02646	Not available
Recycling closed loop (per tonne)	21.354			50
Incineration of clinical waste (per tonne)	880			410
Manufactured chemicals and gases (per £ spent)	0.953			

- **Why are your team the best people to tackle this?**

As a team we all have a passion for sustainability and the reduction of waste. We are enthusiastic, motivated and driven to make a change.

As a diverse team of individual with varying levels of experience we are well-placed to influence others to make changes in their practice. We benefit from a close rapport with all members of the Multidisciplinary Team that we work with on a daily basis. Many of the MDT are also keen to make a difference and we have therefore harnessed this enthusiasm to help facilitate our project.

- **What makes you think that this is an area of high impact for your team to work on? e.g. does your proposed change address a carbon hotspot identified by NHS England?**

According to the Sustainable Development Unit for NHS England, pharmaceuticals are number 1 on the carbon hotspot list, identifying it as an area that needs addressing if they are to achieve their goal of reducing carbon dioxide equivalent emissions by 34% by 2020. (SDU 2019)

The Royal Bournemouth and Christchurch Hospitals Trust has again identified Sustainability and Waste Management as one of their key objectives for 2019/2020, having set a goal to reduce its carbon footprint by 28% by 2020 (since 2013). As trust employees we recognise how much wastage occurs in all areas of our work and are striving to reduce it in any way we can. We see this project as a small change with minimal initial investment that has the potential to not only save the Trust a reasonable amount of money but reduce waste and improve the environment for our patients and staff (RBCH 2019).

By enabling reduction or removal of Ethyl Chloride use in our area, and hopefully our hospital, we will be doing our bit towards achieving these goals.

Goal: what are you aiming to achieve?

- To reduce the usage of Ethyl Chloride spray in RBH Recovery from 4 cans per week to 1 or less.
- To use an audit tool to measure how successful our alternatives are.
- For the alternative to provide accurate and acceptable results to staff and patients.
- For the alternative to meet acceptable standards for infection control and risk management.
- To initiate and facilitate these changes over an 8-week period.

Approach:

● Methods & Details of implementing change

We began by gathering baseline data for 2 weeks on how much Ethyl Chloride spray we were using across two areas – Main Recovery and Derwent Recovery. From this we were able to establish how many cans were used on a weekly basis. Cans are restocked by a pharmacy top up to our store cupboard and stock level is 5, twice a week.

We then looked at reasonable and realistic alternatives to the spray.

We found that in our fridge we had 4 solid stainless-steel sticks with handles that absorbed the cold and could be held against the patient's skin to provide an ice-cold sensation. As we have little access to freezers, this was a better alternative to ice.

We devised an audit tool for staff to complete asking them to use the sticks instead of the spray and record their findings. At the same time, we sought advice from our Acute Pain Team and senior anaesthetist Dr Guy Titley to determine their thoughts and if they had any objections to our trial. They were very supportive and had no issues with the change. We contacted the Infection Control Team to seek advice on how to clean and store the sticks after use and in between patients.

Information was then cascaded to all staff through meetings and emails and they were encouraged to use the sticks whenever possible and to always complete the audit tool. We began the trial first in Main Recovery and then introduced it to the Derwent (recovery area for planned hip and knee replacements) after 2 weeks.

Whilst the trial was ongoing, we began to investigate where we could obtain more of the metal sticks so that if successful, we could introduce them to the whole theatre department and potentially the whole hospital.

We contacted our theatre stores who had no record of anything similar. The sticks bore no manufacturer's name or number and no one recognised them.

On investigation it was found that they were originally sourced from a former member of staff whose husband was a GP.

We decided on a different direction and approached the Acute Pain Team again who had also never seen anything similar but they gave us contacts for the Wessex Regional Acute Pain network to ask them for ideas or suggestions. We asked the Acute Pain Network if they may have alternative ideas to the spray if we were unable to source the metal sticks and what their hospitals were using at the time.

Our hospital uses a local surgical instrument manufacturer based in Bournemouth so we approached Carlyne Hurrell who is the equipment lead for Theatres. She gave us contact details for them to see if they could produce some sticks to our specification and we also emailed various surgical instrument suppliers and manufacturers throughout the country.

- **How did you measure progress?**

By reviewing audit forms on a weekly basis, we were able to gain staff and patient opinion on their experience of using the sticks. We were also able ensure that accurate results were being achieved and clinical care was not being compromised.

By assessing how many cans were being used alongside the stick we were able to measure compliance and effectiveness of the alternative. We numbered the cans left in the cupboards to track how many were being used.

What data did you collect to show:

- **Environmental impact**

We met with a representative from the Estates dept. to find out where our ventilation outflows behind each bed space in recovery are directed. It appears that the expelled air (including the Ethyl Chloride after it has been sprayed) is just released into the atmosphere unfiltered. This means that the spray is left to degrade in the environment as discussed previously (Npi.gov.au.2019).

We liaised with Carbon Footprint expert Ingeborg Steinbach, Project manager for the Centre for Sustainable Health care to help calculate the carbon footprint and costs associated with using Ethyl Chloride spray. By contacting the manufacturer, we were able to compile data on how the cans are manufactured and how far they travel. This, along with the purchase and recycling cost to the hospital was forwarded on to Ingeborg. With the weights of the cans both full and empty, she was able to calculate accurate emissions and carbon footprint data for Ethyl Chloride.

- **Financial impact**

We contacted the Pharmacy Dept and liaised with lead buyer for pharmaceuticals, Alistair Garfield, who confirmed the cost of Ethyl Chloride spray per can to be £17.94. We counted Ethyl Chloride cans in both areas on a weekly basis to assess our new usage of spray and therefore what cost saving we were making.

- **Social impact**

We asked staff to record their comments on how they felt the sticks had performed via the audit form. We asked for comments re- patient reaction/acceptance and if they had encountered any other issues with using the sticks. See data on excel sheets.

- **Clinical Outcomes**

When using the audit tool, staff were asked whether they were able to achieve a satisfactory sensory block level using the metal stick. They were also asked to indicate whether they felt it necessary to double check/confirm the result by using the spray. Infection control advised that cleaning with a Clinell wipe between patients would be sufficient. Matron Will Blackman advised us that labelling the sticks as clean on return to the fridge would satisfy quality assurance. We agreed that we would not trial patients who had any special precautions.

- **How did you collect data?**

Please see below the audit tool we used to collect the data from using metal sticks over a 6-week period.

Audit tool.

Green Project data – Ethyl Chloride Spray

Date: _____

Spinal Epidural

Did you use the cold metal sticks? Yes No

Did you need to use Ethyl Chloride spray? Yes No

Did the cold sticks provide a block level? Yes No

Were the cold sticks accepted by the patient? Yes No

Any comments?

Stainless steel sticks for block testing



We placed eye catching posters around the department to prompt people to use the metal sticks instead of ethyl chloride spray.

AXONGESIC[®]
ethyl chloride B.P.
The Fast-Acting Vapo-Coolant Spray

LOCAL ANAESTHETIC

FINE SPRAY
100 ml

Cinogen Healthcare

Think!

Do you need spray?

Please use a cold stick in the fridge instead

Please fill out a quick audit sheet

Environmental benefit

During the course of the project just over 0.5 cans were used overall per week in both Main and Derwent recoveries. This equates to a reduction of 3.5 cans needing to be disposed of.

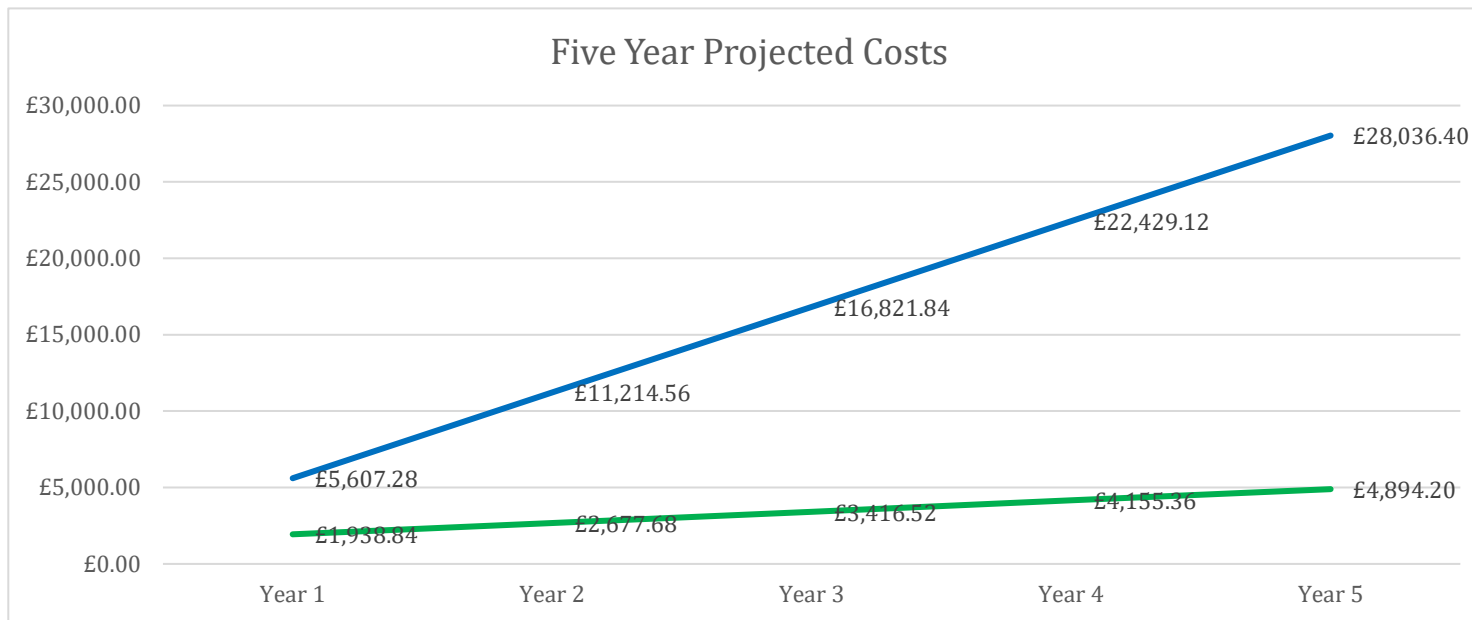
We are unable to measure the exact amount of Ethyl Chloride vapour that is expelled into the air every time it is used but it means 350mls less liquid is being sent into the atmosphere each week.

The emission saving as calculated by Ingeborg Steinbach, Project Manager for the Centre for Sustainable Health care. The carbon savings per year for minimising Ethyl Chloride would be 2,968 kgCO₂e and the cost savings are £3,110.

Carbon Footprint.

Carbon Footprint	KgCO ₂ e	Costs £
Ethyl Chloride	2,963.45	3,109.60
Transport	4.63	Not available
Recycling	0.17	0.41
Total	2,968.25	3,110.01

<p>Social sustainability; benefit to patients, staff and community</p>	<p>The reduction in usage of the spray demonstrates a significant reduction in the ethyl chloride exposure experienced by the patients every time they need a sensory block check. (Not only the amount inhaled but also topical contact). Those who have successfully had their block checked using only the stick will have currently limited their exposure to ethyl chloride to solely that used by the anaesthetist on induction of the spinal anaesthetic. Our aim is to introduce the sticks to the anaesthetic rooms in due course.</p> <p>This is the same for staff members who may carry out the procedure several times in one day on different patients within the confines of a curtained cubicle.</p> <p>The wider community will benefit from the lack of ethyl chloride circulating in the atmosphere and in the air that they are breathing.</p> <p>The benefits of reduced waste and carbon footprint will also be felt by the wider community as we all strive to make our lives more sustainable.</p>
<p>Financial benefit</p>	<p>Our baseline audit established that we use 4 cans per week in Main Recovery which equates to £71.76 and 2 cans per week in Derwent which is £35.88. A total of £107.64 per week.</p> <p>This means over a year we potentially spend £5597.28 on ethyl chloride spray in these two areas alone.</p> <p>By reducing our usage to just 0.792 cans per week over both areas we will have made a saving of £93.43 per week and £560.58 over the course of our 6-week project.</p> <p>There will be an initial investment involved in the purchase of more metal sticks but this will be very quickly offset compared with the price of the spray. As of 8th December, the preliminary cost of the sticks has been quoted as £60 inc. VAT each. If we were to make a purchase of 20 this would mean an initial outlay of £1200.</p> <p>Our expenditure for ethyl chloride spray over one year would £738.84 (based on using 0.792 cans per week)</p> <p>Our expenditure on sticks would be an initial £1200 for the first year – this makes a total of £1938.84 compared to £5597.28 for use of ethyl chloride alone in one year. Recycling costs are minimal (less than 1/5 of a tonne per year)</p> <p>Over 5 years of continuous ethyl chloride usage we would spend £28036.40 (including £50 recycling costs).</p> <p>By adopting cold sticks over 5 years and minimal use of cold spray we would spend just £4894.20 (assuming sticks have a life expectancy of at least 5 years).</p>



Spray Only —
 Sticks and Minimal Spray —

This gives an overall saving to the hospital of **£23142.20**

Should this be change in practice be rolled out to theatres, based on analysis of anaesthetic room use of the spray, we would anticipate the number of cans used per week would also be 6. (Considering they check the patients block on induction in a similar way to recovery). This equates to double the financial savings, reduction in waste and impact on the environment. The price per stick reduces with increase of the number ordered, so the cost would be less if we were to order enough for Theatres and Recovery.

Clinical

We collected 72 audit forms in Main Recovery and the Derwent Recovery over the course of our trial and overall found

outcomes	<p>that the use of the sticks gave a satisfactory and accurate block level which the staff members felt mostly did not need rechecking with the spray. In the instances that it did, invariably the patient was unsure or undecided on what they could feel with both sticks and spray (please refer to audit data for exact results).</p> <p>Members of the Acute Pain Team did not dispute their findings and were happy with the clinical results found. Patients were accepting of the use of sticks and did not express any problems with or dislike of the sticks.</p> <p>From our audit data collection in Main Recovery, out of the 56 audits received, 53 audits were tested for spinals and 3 audits tested for epidurals. Out of the 53 spinals tested with cold sticks, 51 of them were successful and 2 were unsuccessful with 100% acceptance from all patients. 14 of these audits were checked with Ethyl Chloride spray as well as often members of staff wanted to check the cold stick validity.</p> <p>In the Derwent, 16 audits for spinals were completed with 100% success rate and 100% acceptance from the patient. Ethyl Chloride was not needed to check any of these documented spinals.</p>
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Please refer to attached Excel spreadsheets for exact data results.

Barriers that you encountered and how you dealt with these?

During the course of our project we found very little objection or lack of compliance from our staff. Following the initial education and introduction of the audit tool, people needed to be reminded to use the sticks instead of spray. This demonstrates habitual use of ingrained practice which needs to be broken in order to facilitate change. Once staff became familiar with the process and changed their habits, we had no problems. Towards the end of the trial we found that staff became so familiar with the sticks that they forgot to complete their audit tool and so needed prompting. In the Derwent Recovery where all patients have spinal block, compliance was almost 100%. Some spray (0.5 cans) was used in the 4-week trial, our assumption was that on these occasions staff members had forgotten to use a cold stick and fill out an audit form.

We encountered the most problems from trying to source more metal sticks to enable us to expand the project to other areas.

Our request to the Wessex Regional Pain Service members yielded very little. Of the few replies received, no one had seen the blocks before and they either used ice or Ethyl Chloride spray.

Our requests to local and national surgical instrument suppliers also drew a blank, with companies either unable to help or not replying at all. However we continued to search for other willing companies.

We considered the use of ice as is traditionally suggested in policies and practice manuals. (NT 2006), (RMM 2019).

However, ice machines are few and far between in the hospital and the distance to travel to get ice and the lack of storage in Recovery would make it an inefficient and impractical solution.

We discovered that we did have one freezer within the theatre area in which we could keep ice packs. However, on discussion with Estates, the lack of freezers elsewhere would mean the ice pack method could not be adopted in any other area of the hospital.

Our best solution was to continue to obtain more of the sticks and so we approached Theo Labuschagne a representative for a local surgical instrument manufacturer, recommended by Carolyne Hurrell, whom the hospital already uses as a supplier. See below for our progress.

What steps have been taken to ensure lasting change?

Our next step in taking this project forward is to introduce it to the whole of Theatres and the Anaesthetic Directorate. On the 20/11/19 we heard back from Theo who confirmed that his company would be able to supply a similar type of metal stick. We are currently in negotiation with him over costs per unit but the preliminary quote is for £60 per unit up to 20 units and reducing with the number of units ordered. We can now put forward a business

plan with the findings to our Matron Will Blackman. If deemed a financially viable option, we will approach Quality and Risk Management who can advise what specifications need to be adhered to before manufacture but as the company already produce instruments for the NHS we don't anticipate any problems as their standards will already be high with the use of medical grade materials. We will also need to contact the Infection Control Team to ensure the item meets with current hospital policy. We then propose to present our findings to the Clinical Director for Theatres with a view to implementing the change in every theatre area. This would mean that when inserting a spinal or epidural, the anaesthetist would use the sticks instead of the spray. If agreeable, we would then present a purchase order to Procurement.

We do have to be realistic and take into account that not all anaesthetists might embrace this change and may feel that the spray gives them a quicker and more accurate result, particularly when assessing epidural blockade. However, it is our hope that this use would be minimal and that gradual change of practice towards the sticks can take place.

There are many wards in the hospital that also use the spray to check spinal and epidural blockade and so our hope would be for them to adopt the change once we have established it within Theatres and Recovery.

Quotes from staff/patients about the experience of being involved in the Green Ward Competition;

It has been difficult to obtain the opinion of patients over their experience with the sticks as many of them have no prior experience of Ethyl Chloride spray that they can recall. The very nature of their anaesthetic means they have little or no memory of its use in the anaesthetic room prior to their operation. Also, on waking they often remain very drowsy or disinterested and preoccupied with how they feel post-operatively and due to them being under the influence of anaesthetic it is not possible to gain permission to use their name in our results.

One thing we have noticed is that despite the sticks being as cold as the spray, the patients seem to jump a lot less when sticks are used on their abdomen.

We have however gathered together quotes from members of staff participating in the study.

We have had Positive feedback from staff:

Staff member 1, Louise Laho - Staff Nurse:

- What they **thought** about being involved in the Green Ward Competition:
"I think it's a very positive move"
- What they **learnt**:
"I have learnt that a lot more can be replaced than I originally thought"

- How it **affected** them:
"It has made me think twice before I throw something away".

- How they **felt**:
"I feel good that I am making a difference and helping to save the planet"

Staff member 2 - Staff Nurse: Anonymous

- What they **thought** about being involved in the Green Ward Competition:
"It's good"
- How they **felt**:
"Pleased to be making a difference".

Staff member 3 Emma Postle - Staff Nurse:

- What they **thought** about being involved in the Green Ward Competition:
"It's positive"
- What they **learnt**:
"There's lots of little things we can do to help protect the environment and cut costs as well"
- How they **felt**:
"Pleased to help and make a difference"

Staff member 4 – Emily Young Green Team participant:

- What they **thought** about being involved in the Green Ward Competition:
"The team and I have felt very proud to be part of the Green Ward Competition; it has been a very positive step to help us look at areas for improvement that will make lasting change that will benefit patients, staff and the environment, and has financial benefit also. The Green team and wider Recovery team have really worked together for the benefit of the project, and there has been very much a community spirit with staff genuinely wanting to make a difference to the environment and patients. It has had a

ripple effect, where anaesthetists have also shown a lot of interest, with many wanting to help and take our project further. Talks with some anaesthetists have made them think of ways they can make a difference too. It's been a very positive experience."

- What they **learnt**:

"Sometimes the smallest of changes can make a really big difference for patients, staff and the wider community."

- How it **affected** them:

"The project has made me more mindful of other areas for improvement in the Recovery and anaesthetic environment. It has helped to make some really useful contacts and links to individuals that share the same passion and are willing to help make changes. Personally, it has made me to look for more sustainable options at home also."

- How they **felt**:

"Being in the project team has brought its challenges with time constraints and a busy working environment. The Project Team and wider recovery team has really pulled together to implement this change and should feel very proud of what we have managed to achieve in this short time. I am grateful to have played my part in this process."

Staff member 5 - Eunice Matinis - Staff Nurse

- What they **thought** about being involved in the Green Ward Competition:

"I think it is a really good perspective wanting to protect the environment by trying to reduce the usage of substances that affect the planet."

- What they **learnt**:

"I've learnt that we can find different ways to do the same job and save money."

- How it **affected** them:

"I experienced in this few weeks using this new method which seems to work well"

- How they **felt**:

"I feel that for the future if there is any other way that we can help the planet and still keep the patient care on the same level or higher then we can continue on using the cold sticks".

Staff Member 6 – Helen Spencer Jones – Project Leader

- What they **thought** about being involved in the Green Ward Competition:

“I have been passionate about sustainability and reducing waste for many years and I saw this competition as a valuable opportunity to implement change within my department. It was so helpful to have a structured plan to follow and meant we were made aware of every aspect of the process that we had to consider.

As sustainability lead for the department it has given me the knowledge and tools to use when considering other areas to change and I now know that staff can be engaged and will hopefully respond positively to my suggestions in the future.”

- What they **learnt**:

“I have learnt that change is possible and once you have educated people to unlearn the habits they have developed over time and through institutionalised behaviour, they then respond and are happy to comply. I have also learnt that persistence is the key and that you need to persevere with your actions and ideas to achieve progress and see results.”

- How it **affected** them:

“I have already chosen to adopt many changes at home to reduce our consumption of single use plastics and reduce our waste. This project has shown me that others feel as strongly as I do about protecting our environment and that we must harness the power of group influence to make a difference. As I become more aware of what is involved, I realise the enormity of the situation we are facing within the NHS but I feel empowered to continue to make small changes that will contribute to an overall improvement.

- How they **felt**:

“I feel very proud of the work my Team and colleagues have put into making this project happen and I am so grateful for the support and help extended to us from the multi-disciplinary team. I am very excited to see how successful we can be in taking this project forward and hope that we can make a significant difference in reducing the use of Ethyl Chloride. After all – Who needs spray anyway?”

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