



## SUSQI PROJECT REPORT

### Hampshire Hospitals Daisygrip reusable tourniquet trial

**Start date of Project: 18/05/26**

**Date of Report: 28/09/26**



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#### Background:

The phlebotomy team were contacted regarding the opportunity to trial reusable tourniquets by the sustainability team and thought this would be a great idea for a Green team competition.

Hampshire Hospitals Foundation Trust (HHFT) currently uses disposable tourniquets for all venepuncture procedures. In phlebotomy alone this equates to the disposal of approximately 270,000 tourniquets per year! As part of the trial, phlebotomy wanted to look at replacing 80% of tourniquets in phlebotomy outpatients' departments which accounts for >60% of total number of tourniquets used.

It is important that everything that can be done to reduce our Trust's carbon footprint is done. The NHS contributes significantly to the UK's carbon footprint (approximately 4%) making it one of the

largest contributors, with targets to reach net zero by 2045. The aim is to reduce unnecessary wastage in the trust thereby reducing the trust carbon impact. This trial is also easily scalable for use by other departments within the trust and rolling out to our inpatient wards.

As part of the Phlebotomy department's previous Green team competition, the entry; "Making every blood test count" identified this issue from staff feedback.

The team are aware of work undertaken in Greater Glasgow and Clyde (GGC) which showed patients were largely agreeable to the change. By switching from single-use tourniquets to reusable Daisygrip tourniquets, GGC could save 38,754 kgCO<sub>2</sub>e a year based on current procurement figures, this is the same as one person flying return from London to Hong Kong 11 times.

The project aimed to reduce the carbon footprint through Centre for Sustainable Healthcare's principle of lean service delivery (see Figure 1). Aiming to swap 80% of disposable tourniquets for reusable tourniquets, reducing waste. The project aimed to achieve sustainable value by delivering the same high-quality service, without effecting patient or population outcomes, whilst reducing the environmental and financial impact and delivering social value.

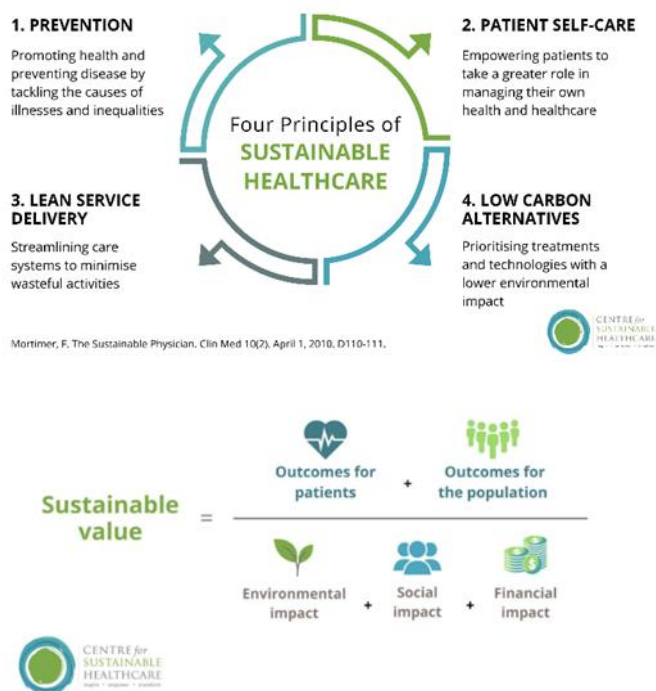


Figure 1. CSH principles of sustainability and CSH sustainable value equation.

The change will be applied across all populations of patients except where it is identified the disposable tourniquet is more in fitting their needs for example fragile skin, small child or patient with learning difficulties. The phlebotomy team see patients aged 5 and over (any younger patients are currently excluded from this trial). The change would be planned across all the trusts hospital sites covering localities of varying affluence.

The Phlebotomy team outpatients' departments were well suited to the trial due to the patient footfall (high numbers) through the department. All different patient groups are seen. The controlled environment and regular staff members through the week who could receive the necessary training and provide both baseline and post-trial feedback.

## Specific Aims:

To improve sustainability and patient experience across phlebotomy outpatient services on all sites through the implementation of reusable tourniquets in 80% of phlebotomy tests performed by Jan 2027.

## Methods:

### Studying the system

Baseline and post-trial feedback data was obtained using Microsoft forms to gather feedback from both staff and patients. Activity data was already available that could be used to assess potential impacts.

The team engaged with numerous key stakeholders during the project planning (see Figure 2). This included infection prevention and control (IPC) over cleaning requirements and general outpatients, who are keen to look at our data with a view to potentially also using the tourniquets in their departments. Stores and Wessex procurement (WPL) were also contacted so items could be ordered and to check cost. Senior management have been informed of the trial and finance will need to be informed of any cost impact. A quality impact assessment was also performed in line with trust requirements.

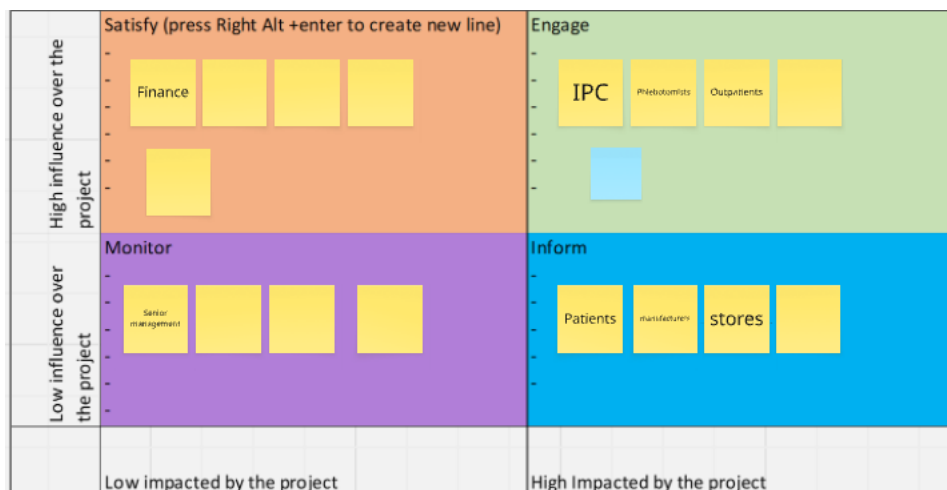


Figure 2. Key stakeholder engagement.

A process map was completed to identify workflow required for change.

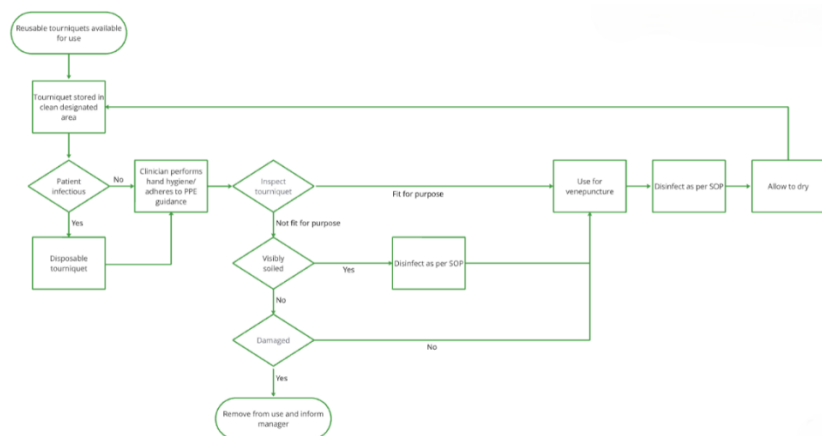


Figure 3. Venepuncture process map.

### Implementing change

The trial was completed over 2 weeks on each of our 3 sites starting 1<sup>st</sup> June and totalling 4 weeks across all sites (Winchester hospital 1<sup>st</sup> 2 weeks in June, Basingstoke weeks 2 and 3, Andover weeks 3 and 4.)

A standard operating procedure (SOP) was written, which was approved by the infection, prevention and control team (IPC) prior to trialling, and a quality impact assessment was also performed in line with trust policy.

Some of the staff feedback was that the wipes used between patients didn't dry before they saw the next patient, sometimes opting to wipe with a paper towel before using the tourniquet on the next patient. This was agreed to be an acceptable amendment to the procedure, if effectiveness contact time for the wipe was maintained.

Some staff mentioned pinching of patients' skin, this was addressed by showing bespoke training around avoiding pinching, if implemented the survey would need to be repeated following this enhanced training. (Link provided in "References and Resources" section.)

The end of day clean was requested by IPC though, of note, this is not routinely required in other trusts. No tourniquets were blood-stained during the trial so this clean was not required.

Sani cloth chlor wipes used in the end of day clean in the trial, are not currently available and would be replaced by Medipal chlorine wipes. If the tourniquet is blood-stained this would potentially require the use of chlorine tabs 10,000ppm chlorine (at a higher strength to the Medipal wipes 5000ppm chlorine). The Medipal wipes are suitable for the regular end of day clean. It is important to ensure the chemical is rinsed off after required contact period (which is included in SOP). The Medipal wipes are flat packets as opposed to hard-plastic container. The change to Medipal wipes from sani cloth chlor has the potential to further reduce emissions by 108 kgCO<sub>2</sub>e per year. Most of this is due to the smaller amount of plastic packaging used in the container of the wipes.

In summary, the following stakeholder groups were identified as key to the initial stages of trial implementation: phlebotomists undertaking the procedure, the Infection Prevention and Control (IPC) team, and Stores.

All phlebotomy staff received training and competency checks, prior to the trial and audits were performed during the trial.

New wipe procurement was setup through stores and the Daisygrips for use during the trial were obtained from the manufacturer, they also provided the training and competency materials. The manufacturer agreed to provide some of the tourniquets free of charge and the remainder were provided on loan.

### Measurement:

Social outcomes were measured such as how comfortable the tourniquet was, would the patient be happy to use the re-usable tourniquet again etc. The Phlebotomy team calculated the change in number of tourniquets required. The cost impact and the difference in carbon footprint for both methods.

The data is a combination of actual outcomes and projections from actual activity figures for 2025.

#### *Patient outcomes:*

- Appropriate standards of care continue to be met.
- Any incidents will be reported using the trusts usual reporting system: InPhase.
- There are no anticipated adverse impacts on patient outcomes associated with this project. It aims to deliver equivalent levels of safe and effective care, while achieving reductions in environmental and financial costs and contributing positively to social value.

#### *Environmental sustainability:*

Data was collected from the phlebotomy team working on the switch from single use tourniquets to Daisy Grip reusable tourniquets. Data on number of blood tests taken in both the inpatient and outpatient setting were collected from January 2025 to December 2026 across the three sites.

A cradle-to-grave carbon footprint analysis was used to estimate the items greenhouse gas (GHG) emissions, including raw material extraction and primary material production of the tourniquet and its packaging, transport, cleaning and end of life disposal. Both single use tourniquets and Daisy Grip reusable tourniquets were carbon footprinted using a process- based carbon footprint analysis.

Items were weighed by the team or their supplier and included the tourniquet and associated packaging.

Data was obtained from previous studies by the Centre for Sustainable Healthcare such as the 2024 South Yorkshire reusable tourniquets study and other references. Where data was not available, calculations were made based on the weight and material of the product. Material weights were converted into GHG emissions using emission conversion factors taken from the Department of Energy Security and Net Zero (DESNZ)'s Greenhouse Gas Reporting Conversion Factors 2026 database (<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2026>),

ICE V4.0 database (via <https://circularecology.com/news/ice-database-v4-1-released>) and [Climatig](#). The analysis included GHG emissions associated with primary materials production, transport, and disposal.

For end-of-life treatment, disposable equipment was assumed to be disposed of as offensive waste, while any card/paper packaging waste was assumed to be dry mixed recyclable with the corresponding emission factors taken from [Rizan et al., 2020](#). The carbon footprint of waste disposal of the items was based on [Rizan et al., 2020](#) carbon footprint of high temperature incineration for clinical waste.

Transport was calculated from the NHS Supply Chain (Express Park, Bristol Road, Bridgwater TA6 4RN) to Winchester Hospital (SO22 5DG). The distance is 122 miles/195 km.

Carbon footprint per tourniquet and per use were calculated. In addition, the carbon footprint of the sterilisation wipe (Sani cloth) was calculated.

### Number of blood tests taken

Data on the number of tourniquets used by month of year and by location (inpatient and outpatient) was provided and is shown in Table 1.

**Table 1.** Number of blood tests taken by month for inpatients and outpatients.

| Month        | Inpatient blood tests | Outpatient blood tests |
|--------------|-----------------------|------------------------|
| Jan          | 7583                  | 13578                  |
| Feb          | 7634                  | 13771                  |
| Mar          | 9518                  | 17408                  |
| Apr          | 7521                  | 13033                  |
| May          | 7293                  | 14476                  |
| Jun          | 8926                  | 18736                  |
| Jul          | 6714                  | 14687                  |
| Aug          | 6662                  | 13616                  |
| Sep          | 8580                  | 17863                  |
| Oct          | 7018                  | 9930                   |
| Nov          | 6630                  | 15385                  |
| Dec          | 7746                  | 15889                  |
| <b>Total</b> | <b>91825</b>          | <b>178372</b>          |

(Figures taken from actual 2025 activity)

### *Economic sustainability:*

- Financial data was obtained from existing activity records, costs of supplies from stores and sustainability provided costs for waste stream.
- There have been no additional costs to this point.

There will be no cost pressure on the department for approximately 1 and a half years due to money available from our charitable fund from our previous Green Team award. The team can

then demonstrate costs involved are less than those associated with purchasing single use tourniquets.

- Cost improvement: This is from avoided waste disposal costs non-infectious clinical waste (costs/tonne), and consumable costs.

#### *Social sustainability:*

- Qualitative data from patient surveys: A Microsoft forms survey was accessed by patients attending our outpatient's clinic during the trial via a QR code on a poster, there were 463 responses which allowed the team to make clear conclusions on how the patients felt about the potential change.
- Staff social outcomes from surveys: Baseline and post-trial staff surveys were also completed using Microsoft forms. 42 responses were obtained for the baseline survey and 32 responses post-trial.

## Results:

#### *Environmental and financial sustainability:*

##### **Single use, disposable tourniquets**

Single use disposable tourniquets are made from silicon. A length of silicon comprises of 25 individual tourniquets wrapped around a cardboard roll within a carton box. They are distributed in a shipping (cardboard) box containing 40 carton boxes of tourniquets. Table 2 has the weights of the shipping box and carton box of 25 tourniquets.

**Table 2.** Weight of shipping box containing 40 carton boxes of tourniquets

| Shipping box of 40 cartons of tourniquets     | Weight (g) |
|-----------------------------------------------|------------|
| Gross weight 7 kg                             | 7000       |
| Net weight 6.6 kg                             | 6600       |
| Number of carton boxes of tourniquets         | 40         |
| Number of rolls of tourniquet per carton box  | 25         |
| Weight of shipping cardboard box              | 320        |
| Weight per carton box roll of tourniquets (g) | 167        |

There are a total of 1000 tourniquets in the shipping box. The amount of cardboard in the shipping box attributed to each individual tourniquet is 0.4g, and per carton box of 25 is 8g.

##### **Breakdown of the weights and materials per carton box of 25 tourniquets**

The total weight is 167g per carton box. The 'out the box' weight is 153g, the cardboard carton weighs 14g and the inner cardboard roll is 4g, with the remaining weight due to the silicon tourniquets. The results are shown in Table 3.

**Table 3.** Component parts, materials and weights of carton of single use tourniquets

| Item       | Material  | Weight (g) |
|------------|-----------|------------|
| Carton box | Cardboard | 14         |
| Inner roll | Cardboard | 4          |
| Tourniquet | Silicon   | 149        |

## Emissions for single use, disposable tourniquets

### Tourniquet Calculations

The results are summarised in Table 4, with the carbon footprint for the raw materials, production and waste disposal of each component of the single use tourniquet shown.

Emissions from raw materials and production use the equation

$$\text{Emissions} = \text{weight of component} * \text{emission factor based on material of component}$$

Emissions from waste use the equation

$$\text{Emissions} = \text{weight of component} * \text{emission factor based on waste stream of component}$$

Emission factors for waste are 1074 kgCO<sub>2</sub>e /tonne for clinical waste and 172 kgCO<sub>2</sub>e /tonne for dry mixed recycling.

**Table 4.** Summary of emissions from tourniquet raw materials, production, waste disposal and transportation

|                                                | Weight (per carton of 25 tourniquets) (g) | Material               | Emission Factor for raw materials and production (kgCO <sub>2</sub> e) | Emissions per carton of 25 (gCO <sub>2</sub> e) | Emissions from waste (gCO <sub>2</sub> e) (See Table 5) | Total emissions (gCO <sub>2</sub> e) |
|------------------------------------------------|-------------------------------------------|------------------------|------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------|--------------------------------------|
| External shipping box (per box of tourniquets) | 8                                         | Cardboard              | 1199.7                                                                 | 10                                              | 1.4                                                     | 11.0                                 |
| Carton box                                     | 14                                        | Paper and board: mixed | 1288.5                                                                 | 18                                              | 2.4                                                     | 20.4                                 |
| Inner roll                                     | 4                                         | Paper and board: mixed | 1288.5                                                                 | 5                                               | 0.7                                                     | 5.7                                  |
| Tourniquet                                     | 149                                       | Silicone               | 3340.0                                                                 | 498                                             | 84.8                                                    | 658                                  |
| Transport (See below)                          | n/a                                       | n/a                    | 0.127                                                                  | 4                                               |                                                         | 4                                    |
| Total                                          |                                           |                        |                                                                        | 534                                             | 89.3                                                    | 623.3                                |

Total emissions are calculated 623.3 gCO<sub>2</sub>e per box of 25 tourniquets and includes waste disposal. This comprises of 534 gCO<sub>2</sub>e from the tourniquet, its packaging and transport and 89.3 gCO<sub>2</sub>e from the waste disposal. Emissions per individual tourniquet is 24.9 gCO<sub>2</sub>e.

Based on the total number of blood tests taken, total emissions for outpatients and inpatients is shown in Table 5.

**Table 5.** Yearly emissions by department

|              | <b>Total number</b> | <b>Total emissions from tourniquets (kgCO<sub>2</sub>e)</b> |
|--------------|---------------------|-------------------------------------------------------------|
| Outpatients  | 178,372             | 4,450.64                                                    |
| Inpatients   | 91,825              | 2,291.17                                                    |
| <b>Total</b> | <b>270,197</b>      | <b>6,741.80</b>                                             |

### Summary

- Emissions per carton of 25 tourniquets are 623.3 gCO<sub>2</sub>e
- Emissions per individual tourniquet is 24.9 gCO<sub>2</sub>e.
- Emissions per year for all tourniquets used is 6,741.8 kgCO<sub>2</sub>e.

### Transport emissions

Transport emissions are calculated by weight of product, distance travelled and emissions per tonne.km travelled and number of journeys taken.

- The weight of a carton of tourniquets is 167g.
- The product is delivered from Express Park, Bristol Road, Bridgwater TA6 4RN which is 122 miles (195 km) from Winchester Hospital, SO22 5DG.
- The Emissions Factor is 0.127 kgCO<sub>2</sub>e /tonne.km for an average laden, non-refrigerated HGV lorry.

Carbon emissions associated with transporting one carton of tourniquets is 4 gCO<sub>2</sub>e (0.004 kgCO<sub>2</sub>e).

### Waste disposal

#### Emissions from waste disposal

There are emissions and costs associated with waste disposal.

The results for emissions and costs resulting from waste disposal are shown in Table 6. Costs of recycling are £110 per tonne. Costs to manage offensive waste are £442 per tonne.

**Table 6.** Emissions and costs associated with waste disposal per carton of 25 tourniquets.

| <b>Item</b> | <b>Material</b> | <b>Weight per carton of 25 tourniquets (g)</b> | <b>Waste stream</b> | <b>Emission factors for waste stream (kgCO<sub>2</sub>e /tonne)</b> | <b>Waste costs per tonne (£)</b> | <b>Emissions (gCO<sub>2</sub>e)</b> | <b>Costs (p)</b> |
|-------------|-----------------|------------------------------------------------|---------------------|---------------------------------------------------------------------|----------------------------------|-------------------------------------|------------------|
| Carton box  | Cardboard       | 14                                             | Recycling           | 172                                                                 | 110                              | 2.4                                 | 0.13             |
| Inner roll  | Cardboard       | 4                                              | Recycling           | 172                                                                 | 110                              | 0.7                                 | 0.04             |
| Tourniquet  | Silicone        | 149                                            | Offensive waste     | 569                                                                 | 442                              | 84.8                                | 6.59             |

|              |           |     |           |     |     |      |      |
|--------------|-----------|-----|-----------|-----|-----|------|------|
| Shipping box | Cardboard | 8   | Recycling | 172 | 110 | 1.4  | 0.11 |
| Total        |           | 175 |           |     |     | 89.3 | 6.87 |

The costs and emissions associated with waste disposal per carton of 25 tourniquet are 89.3 gCO<sub>2</sub>e and 6.6p respectively. Per tourniquet, this is 3.57 gCO<sub>2</sub>e and 0.27p.

#### Cost of waste disposal per year.

The total weight and costs of annual waste disposal is shown in Table 7. Each carton contains 25 tourniquets, with recycled waste weighing 26g and comprising of cardboard, and offensive waste weighing 149g from the silicone tourniquet. Total weight of waste is 175g as per Table 5. Costs are £110 per tonne for recycling and £442 per tonne of offensive waste.

**Table 7.** Weight and costs associated with waste disposal per year for inpatient and outpatients.

|                    | Number of tourniquets used | Number of cartons of tourniquets | Waste weight (kg) | Cardboard weight for recycling (kg) | Offensive waste weight (kg) | Recycling cost | Offensive waste cost per tonne | Total cost (£) |
|--------------------|----------------------------|----------------------------------|-------------------|-------------------------------------|-----------------------------|----------------|--------------------------------|----------------|
| <b>Out patient</b> | 178,372                    | 7,135                            | 1,248.6           | 185.5                               | 1063.1                      | £20.41         | £469.89                        | £490.30        |
| <b>In patient</b>  | 91,825                     | 3,673                            | 642.8             | 95.5                                | 547.3                       | £10.51         | £241.91                        | £252.42        |
| <b>Total</b>       | <b>270,197</b>             |                                  |                   |                                     |                             |                |                                | <b>£742.72</b> |

#### Total annual emissions and costs for single use tourniquets

Each disposable tourniquet is associated with emissions of 24.9 gCO<sub>2</sub>e (0.0249 kgCO<sub>2</sub>e) and a purchase cost of 3.28p.

Total emissions from raw materials, production, transport and waste disposal were calculated using annual activity data. Based on 178,372 outpatient blood tests and 91,825 inpatient blood tests, total purchase costs were £5,850.60 and £3,011.86 respectively. Waste disposal costs were calculated separately and are included in the total costs shown in Table 8.

**Table 8.** Emissions and cost of purchasing tourniquets

|              | Total number   | Total emissions from tourniquets (kgCO <sub>2</sub> e) | Cost of tourniquets (£) | Waste costs (£) | Total costs (£)  |
|--------------|----------------|--------------------------------------------------------|-------------------------|-----------------|------------------|
| Outpatients  | 178,372        | 4,450.64                                               | £5,850.6                | £490.30         | £6,340.9         |
| Inpatients   | 91,825         | 2,291.17                                               | £3,011.86               | £252.42         | £3,264.28        |
| <b>Total</b> | <b>270,197</b> | <b>6,741.80</b>                                        | <b>£8,862.46</b>        |                 | <b>£9,605.18</b> |

## Reusable Daisy Grip tourniquet

Details on the Daisy Grip reusable tourniquet are available at [Product details for FVH85099 - NHS Supply Chain Online Catalogue](#). The tourniquet is made from two pieces of plastic (end piece and clasp) and silicone band. The weights were supplied by the company. The total weight is 80g.

The weight of the tourniquet is 66g consisting of 32g silicone band and 30g of plastic and 3.75g nickel. There is an additional 5.05g of instructions for use, 4.7g for zip lock bag and 3.75g cardboard carton. The weight of any additional shipping box is not known.

The Daisy Grip tourniquet can be used 10,000 times.\* It is possible it will last even longer and this hasn't yet been tested.

Using a reusable tourniquet involves two additional steps – namely the cleaning after each patient with a Clinell wipe and sterilisation with a Sani Cloth at the end of each day.

## Emissions per DaisyGrip tourniquet

The results are summarised in Table 9, with the carbon footprint for the raw materials, production and waste disposal of each component of the reusable DaisyGrip tourniquet shown.

Emissions from raw materials and production use the equation:

$$\text{Emissions} = \text{weight of component} * \text{emission factor based on material of component}$$

Emissions from waste use the equation:

$$\text{Emissions} = \text{weight of component} * \text{emission factor based on waste stream of component}$$

Emission factors for waste are 172 kgCO<sub>2</sub>e /tonne for dry mixed recycling.

**Table 9.** Summary of emissions associated with the raw materials, production, waste disposal and transport of a DaisyGrip tourniquet.

|                    | Weight per tourniquet (g) | Material                               | Emission Factor raw material and production (kgCO <sub>2</sub> e) | Emissions (gCO <sub>2</sub> e) per tourniquet | Emission factor for waste (kgCO <sub>2</sub> e) | Emissions from waste (gCO <sub>2</sub> e) (See below) | Total emissions |
|--------------------|---------------------------|----------------------------------------|-------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------|-------------------------------------------------------|-----------------|
| Silicon            | 32                        | <i>Silicone</i>                        | 3340.0                                                            | <b>107</b>                                    | 172                                             | <b>5.5</b>                                            | 112.4           |
| Nickel             | 3.75                      | <i>Nickel</i>                          | 12400.0                                                           | <b>47</b>                                     | 172                                             | <b>0.6</b>                                            | 47.1            |
| Copolyester        | 30                        | <i>Plastics: average plastic rigid</i> | 3354.3                                                            | <b>101</b>                                    | 172                                             | <b>5.2</b>                                            | 105.8           |
| Plastic bag (LDPE) | 5.05                      | <i>Plastics: LDPE and</i>              | 2965.1                                                            | <b>15</b>                                     | 172                                             | <b>0.9</b>                                            | 15.8            |

|                             |      |                                           |        |          |     |            |       |
|-----------------------------|------|-------------------------------------------|--------|----------|-----|------------|-------|
|                             |      | <i>LLDPE<br/>(incl.<br/>forming)</i>      |        |          |     |            |       |
| A4 info<br>sheet<br>(paper) | 4.69 | <i>Paper<br/>and<br/>board:<br/>paper</i> | 1345.1 | <b>6</b> | 172 | <b>0.8</b> | 7.1   |
| Cardboard<br>box            | 3.75 | <i>Paper<br/>and<br/>board:<br/>mixed</i> | 1288.5 | <b>5</b> | 172 | <b>0.6</b> | 5.5   |
| Transport<br>(See below)    | n/a  | n/a                                       | 0.127  | <b>2</b> | n/a | <b>n/a</b> | 2     |
| Total                       | 80   |                                           |        | 282      |     | 13.6       | 295.8 |

Total emissions per DaisyGrip tourniquet are 295.8 gCO<sub>2</sub>e, for all 40 DaisyGrip tourniquets purchased, emissions are 11.83 kgCO<sub>2</sub>e.

### Transport emissions

Transport emissions are calculated by weight of product, distance travelled and emissions per tonne/km travelled and number of journeys taken.

*Total emissions = Weight in tonnes per delivery\*distance in km\*emission factor*

- The weight of a DaisyGrip tourniquet is 80g.
- The product is delivered from Express Park, Bristol Road, Bridgwater TA6 4RN which is 122 miles (195 km) from Winchester Hospital, SO22 5DG.
- The Emissions Factor is 0.127 kgCO<sub>2</sub>e /tonne.km for an average laden, non-refrigerated HGV lorry.

Carbon emissions associated with transporting one DaisyGrip tourniquet is 2 gCO<sub>2</sub>e (0.002 kgCO<sub>2</sub>e).

### Waste disposal emissions

There are emissions and costs associated with waste disposal

*Total emissions = Weight in tonnes\*emission factor for waste stream*

Assuming the Daisy Grip is disposed of in domestic waste after final clean i.e. no offensive material present, the emissions factor is 172 kgCO<sub>2</sub>e/tonne. At a total weight of 80g, emissions from waste disposal are 0.0136 kgCO<sub>2</sub>e or 13.6 gCO<sub>2</sub>e per tourniquet.

### Sterilisation with Sani cloth chlor Wipe

One Sani cloth chlor wipe is used to sterilise each tourniquet after each day's use. Sani wipes come in a pack of 50 which weighs a total of 626g. The weights of each component part have been identified and weighed. The results are shown in Table 10. They are disposed of in clinical waste.

**Table 10.** Sani wipe components with material and weight with total emissions per pack of 50 wipes.

|                                | Material                     | Weight (g) | Emissions factor (kgCO <sub>2</sub> e /tonne) | Emissions (gCO <sub>2</sub> e) |
|--------------------------------|------------------------------|------------|-----------------------------------------------|--------------------------------|
| Plastic canister and lid       | Plastics: average plastics   | 94         | 3172.5                                        | 298                            |
| Nonwoven wipe material         | Non-woven polyester          | 500        | 5560.0                                        | 2780                           |
| Chemical solution/disinfectant | Sodium hypochlorate (bleach) | 32         | 923.5                                         | 30                             |
| Waste disposal                 |                              | 626        | 1074.0                                        | 672                            |
| <b>Total</b>                   |                              |            |                                               | <b>3,780</b>                   |

Total emissions per pack of 50 Sani Cloth is 3,780 gCO<sub>2</sub>e. Emission per wipe are 75.6 gCO<sub>2</sub>e.

Change to Medipal wipes; potential to further reduce emissions by 108 kgCO<sub>2</sub>e per year. (Emissions 3672 gCO<sub>2</sub>e PA) Using the following calculations;

Emissions per pack of chlorine Medipal wipes are 2.83 kgCO<sub>2</sub>e, waste disposal 0.58 kgCO<sub>2</sub>e - total 3.41 kgCO<sub>2</sub>e per pack

For the sani wipe, they are 3.11 kgCO<sub>2</sub>e for the pack and 0.67 kgCO<sub>2</sub>e for the waste disposal - total 3.78 kgCO<sub>2</sub>e.

Both packs have 50 wipes, therefore emissions per wipe are 68 gCO<sub>2</sub>e (0.068 kgCO<sub>2</sub>e) for the chlorine Medipal wipes and 76 gCO<sub>2</sub>e (0.076 kgCO<sub>2</sub>e) for the Sani wipes.

292 packs of sani wipes are used per year (based on one per day per tourniquet). Moving to Medipal chlorine wipes will reduce emissions by 108 kgCO<sub>2</sub>e per year. Most of this is due to the smaller amount of plastic packaging used in the container of the wipes.

### Emissions of annual use

A single Daisy grip tourniquet emits 295.8 gCO<sub>2</sub>e per individual tourniquet. The total number of tourniquets bought is 40 with 30 being used in outpatients and 10 on the wards. Assuming each tourniquet is used 10,000 times, emissions per use are 0.033 gCO<sub>2</sub>e.

Sani Cloth sterilisation has emission per wipe of 75.6 gCO<sub>2</sub>e. One is used each day (365 days a year) for each tourniquet.

Table 11 shows the emissions from each of the three components and the total emissions.

**Table 11.** Emissions from the DaisyGrip tourniquets, and Sani cloth wipes.

|              | <b>Total number of patients bled</b> | <b>Number of tourniquets</b> | <b>Emissions from tourniquets (kgCO<sub>2</sub>e)</b> | <b>Emissions from Sani cloth</b> | <b>Total emissions</b> | <b>Emissions from Medipal wipes</b> | <b>New total emissions</b> |
|--------------|--------------------------------------|------------------------------|-------------------------------------------------------|----------------------------------|------------------------|-------------------------------------|----------------------------|
| Out patients | 178372                               | 30                           | 8.87                                                  | 827.8                            | 836.67                 | 744.6                               | 753.47                     |
| In patients  | 91825                                | 10                           | 2.96                                                  | 275.9                            | 278.86                 | 248.2                               | 251.16                     |
| <b>Total</b> | <b>270197</b>                        | <b>40</b>                    | <b>11.83</b>                                          | <b>1103.7</b>                    | <b>1115.53</b>         | <b>992.8</b>                        | <b>1004.63</b>             |

Total annual emissions are 1115.53 kgCO<sub>2</sub>e,

Initially Clinell wipe emissions were included in this total, however the Clinell wipes are already used routinely; 1 per patient, to clean the blood collection trays, the same wipes can be used to first clean the tourniquet between use. This reduces the emissions by 83%.

### **Costs per year**

#### *Purchase costs*

A DaisyGrip tourniquet costs £23. The total number of tourniquets bought is 40 with a total cost of £920.

Sani cloth pack size is 50 per pack and costs £2.46. Assuming each tourniquet is used 365 days a year, then a total of (40\*365) 14,600 Sani cloths will be needed for a daily sterilisation. Total number of packs used is 292.

**Table 12.** Costs of purchase of cleaning and sterilisation items

| <b>Item</b> | <b>Cost per pack (£)</b> | <b>Number of packs used</b> | <b>Total cost (£)</b> |
|-------------|--------------------------|-----------------------------|-----------------------|
| Sani cloth  | 2.46                     | 292                         | £718.32               |
| Medipal     | 2.00                     | 292                         | £584                  |

#### *Waste disposal costs*

Costs associated with waste disposal are £442 per tonne of offensive waste used for Sani cloth wipes. The total weight of 40 DaisyGrip tourniquets is 3.2kg. If disposed through the domestic waste stream with disposal costs of £110 per tonne, costs are £0.35 (35p)

**Table 13.** Waste disposal costs

| <b>Item</b>  | <b>Weight per pack (kg)</b> | <b>Number of packs used</b> | <b>Total weight (kg)</b> | <b>Waste stream</b> | <b>Waste costs per tonne (£)</b> | <b>Total cost of waste</b> |
|--------------|-----------------------------|-----------------------------|--------------------------|---------------------|----------------------------------|----------------------------|
| DaisyGrip    | 0.08                        | 40                          | 3.2                      | Domestic            | 110                              | £0.35                      |
| Sani cloth   | 0.626                       | 292                         | 182.8                    | Offensive           | 442                              | £80.79                     |
| <b>Total</b> |                             |                             |                          |                     |                                  | <b>£81.14</b>              |

(The change to Medipal wipes is deemed to be an insignificant change to cost of waste, for purposes of this report-same figures used)

When changing to Medipal wipes from Sani cloth The total yearly cost of using the DaisyGrip is **£1585.14** consisting of £920 purchasing the DaisyGrip tourniquets, £584 purchasing of cleaning materials, £81.14 from waste disposal costs.

### *Social outcomes:*

Qualitative data has been obtained, please see “Reference and resources” for full reports.

### Patient feedback

2. If you answered Yes to Question 1, how comfortable was the tourniquet used previously?



3. How comfortable was the tourniquet used today?



9. Compared with previous experiences (if applicable) how would you rate this tourniquet?



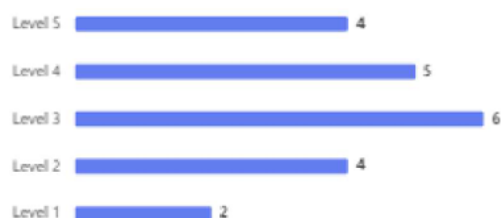
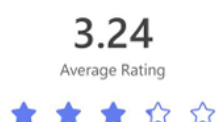
10. Would you be comfortable to use a reusable tourniquet again?

|       |     |
|-------|-----|
| Yes   | 414 |
| No    | 12  |
| Maybe | 29  |



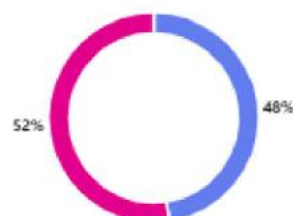
## Staff feedback

1. Overall, how satisfied are you with the Daisy Grip reusable tourniquets?



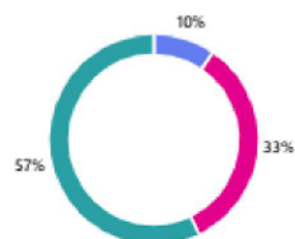
4. Was there any skin damage/concerns from using the tourniquet?

|     |    |
|-----|----|
| Yes | 10 |
| No  | 11 |



7. Overall would you recommend switching from disposable tourniquets to the Daisy Grip tourniquets?

|                                                    |    |
|----------------------------------------------------|----|
| Yes                                                | 2  |
| No                                                 | 7  |
| For most patients whilst keeping disposable option | 12 |



## Summary

Comparing single use and reusable tourniquets, there is an opportunity to save money and reduce greenhouse gas emissions by moving to the DaisyGrip reusable tourniquet.

Single use tourniquet

- Total annual emissions are 6,741.8 kgCO<sub>2</sub>e
- Total annual costs £9,605.18

#### Daisy Grip tourniquets

- Total annual emissions are 1004.6 kgCO<sub>2</sub>e
- Total annual costs £1585.14

The Trust can save a total of £8020.04 financially, and 5734.3 kgCO<sub>2</sub>e in GHG emission per year by changing to the Daisygrip reusable tourniquets from disposable tourniquets in Phlebotomy alone. This is the equivalent of driving a typical petrol car for about 20,000 to 25,000 miles!

#### *Patient outcomes:*

##### Comfort:

The patient comfort scores were higher for the Daisygrip tourniquets than the reusable tourniquets with 85% favourable scores as opposed to 56% respectively.

- \* 91% of patients said they would be happy to use a re-usable tourniquet again!

Staff were less positive, with main concern being over pinching the skin or not being able to get the tourniquet tight enough to have maximum affect. They did however say they would be happy to use for some of the patient population, the tourniquets were easy to use, easy to clean and adaptable for varying limb size. It can take time to adjust to new protocols, and it is recognised that usually staff will adapt to change once it becomes established (Kübler-Ross Change Curve).

#### Discussion:

In summary there would be both a sustainability and cost improvement from replacing most of the trust disposable tourniquets with reusable tourniquets. The patients were happy to use the reusable tourniquets again, the staff on the whole would be happy to use them if adjustments to the protocols were made, such as a change to cleaning protocol and means to avoid the tourniquet pinching. The target of 80% change is more realistic than a complete change as this would provide reassurance that the disposable option is still available and IPC raised that specific inpatient areas should continue to use the disposable tourniquets if the tourniquets are rolled out more widely, due to higher risk of infection.

Staff have suggested that Phlebotomy management explores any alternative reusable tourniquets on the market to see if they provide better engagement from the team, whilst maintaining the carbon and cost-saving benefits.

This project is easily scalable to outpatients who have agreed to consider the same change based on data generated from this project. The setting is very similar and so we would expect similar outcomes with the same level of training, competency check and auditing protocols.

A next step would be to trial in inpatient areas and data could then be used to see if wards could also use the reusable tourniquets when clinicians are performing venepuncture themselves. The more widespread use would provide an increased carbon sustainability impact and cost saving across the trust.

Some data was also obtained in relation to the use of disposable aprons for each patient. This data could be utilised if the trust wished to consider a change to this protocol in conversation with IPC. The team are also aware of other trusts that do not wear aprons at all for phlebotomy due to the relatively low risks associated with the procedure.

## Conclusions:

The data obtained during this project is extremely useful in making decisions regarding the use of reusable tourniquets in the trust. It has allowed the team to assess impact against risk and change planned protocols to provide a greater impact. The trial incorporated patient and staff feedback, allowing for a co-design approach.

Key elements that contributed to the success of this project were careful planning and organisation for implementation. Discussion with other interested parties and openness to ideas from different groups.

It is important to have a mindset that not everything will go as expected and make allowances for changes to protocol.

Initial discussions have begun with the Outpatients department, regarding transitioning to the Daisygrip tourniquets. We believe they would be the most appropriate next area to include in a pilot once the protocol has been finalised, taking into account both staff and patient feedback.

The phlebotomy department managers would like to review the protocol with IPC before agreeing with Phlebotomy team on implementation but are confident that reusable tourniquets can be used within the department and the aim can be reached by January 2027 as planned. The team would be happy to continue to be involved in more widespread use around the trust or to assist external hospitals in providing information around the project.

## References and Resources

- IPC greener exemplar report (P31 relating to reusable tourniquets):



IPC greener  
exemplar report.pdf

- GGC report:



GGC Tourniquet  
LCA Report (1).docx

- Sani cloth chlor MSDS:



sani cloth chlor  
MSDS.pdf

- Clinell Universal wipes MSDS:



CLINELL Universal  
wipes SDS.pdf

- Sustainability report:



Phlebotomy 2026  
Environmental Sust:

- Trial SOP:



Re-usable tourniquet  
SOP.doc

- Audit template



Spot Check  
Audit.docx

- Daisygrip training video

[daisygrip - The Reusable Tourniquet](#)



Staff baseline survey  
summary.pdf



post trial staff  
feedback summary 07

- Staff feedback summary pre and post-trial



Patient feedback  
summary.pdf

- Patient feedback summary

| Critical success factors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| People                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Resources                                                                                                                                                                                                                                                                                                                                                                                                                  | Context                                                                                                                                                                                                                                                                                                                                                      |
| <input type="checkbox"/> Patient involvement and/or appropriate information for patients - to raise awareness and understanding of intervention<br><br><b>x Staff engagement</b><br><br><input type="checkbox"/> MDT / Cross-department communication<br><br><input type="checkbox"/> Skills and capability of staff<br><br><input type="checkbox"/> Team/service agreement that there is a problem and changes are suitable to trial (Knowledge and understanding of the issue)<br><br><input type="checkbox"/> Support from senior organisational or system leaders | <input type="checkbox"/> clear guidance / evidence / policy to support the intervention.<br><br><input type="checkbox"/> Incentivisation of the strategy – e.g., QOF in general practice<br><br><input type="checkbox"/> systematic and coordinated approach<br><br><input type="checkbox"/> clear, measurable targets<br><br>x long-term strategy for sustaining and embedding change developed in planning phase<br><br><input type="checkbox"/> integrating the intervention into the natural workflow, team functions, technology systems, and incentive structures of the team/service/organisation | <input type="checkbox"/> Dedicated time<br><br><input type="checkbox"/> QI training / information resources and organisation process / support<br><br><input type="checkbox"/> Infrastructure capable of providing teams with information, data and equipment needed<br><br><input type="checkbox"/> Research / evidence of change successfully implemented elsewhere<br><br><input type="checkbox"/> Financial investment | <input type="checkbox"/> aims aligned with wider service, organisational or system goals.<br><br><input type="checkbox"/> Links to patient benefits / clinical outcomes<br><br><input type="checkbox"/> Links to staff benefits<br><br><input type="checkbox"/> 'Permission' given through the organisational context, capacity and positive change culture. |