# The Environmental Impact of Single-use Verses Reusable Tourniquets at Greater Glasgow & Clyde NHS

## Aim

This report provides a summary of the environmental impact of switching from single-use tourniquets to reusable tourniquets across NHS Greater Glasgow & Clyde.

## Current situation

From 1st August 2022 to 31st July 2023, 1,719,975 single use tourniquets were procured across NHS Greater Glasgow & Clyde (GGC). Three different brands of single-use tourniquet are currently being used across GGC: the Medline band tourniquet, Becton Dickinson (BD) band tourniquet, and Vygon quick release button tourniquet. Table 1 details the volume procured per year per tourniquet brand. GGC would like to switch to use the reusable Daisygrip tourniquet to support their Net Zero targets.

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| **Brand** | **Volume procured per year\*** |
| Medline | 1,318,800 |
| Vygon | 80,700 |
| BD | 320,475 |
| *Total* | *1,719,975* |

Table 1: Number of tourniquets procured across GGC NHS per year split by brand
 \* procured between 1st August 2022 and 31st July 2023

## Methodology

Simapro was used to undertake a Life Cycle Assessment (LCA) of the three single-use tourniquets as well as the reusable Daisygrip and a Clinell wipe. An LCA is used to evaluate the potential environmental impacts throughout the entire life cycle of a product (extraction of raw materials, production, distribution, use, and end-of-life phases) or service.

Table 2 details the assumptions included in the calculations for all tourniquets. For the Daisygrip, one Clinell wipe was included per use as it was assumed that one wipe would be needed to disinfect the Daisygrip in between uses to ensure infection control guidelines are followed.

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|  | **Inclusions** | **Exclusions** |
| Medline | Item raw material: *synthetic rubber.*1st layer of packaging: *one rubber band per individual tourniquet, cardboard box containing 100 tourniquets, plastic bag inside box containing 100 tourniquets.* 2nd layer of packaging: *shipping cardboard box containing 10 boxes of 100 tourniquets.*Transport: *Bangkok (country of manufacture) to London Thamesport via container ship. London Thamesport to Glasgow Queen Elizabeth University Hospital (QEUH) via freight lorry.* Disposal | Manufacturing primary products into item.Transport from to and from supplier  |
| Vygon | Item raw materials: *silicone band, ABS plastic button*1st layer of packaging: *cardboard box containing 100 tourniquets*Transport: *Shanghai (country of manufacture) to London Thamesport via container ship. London Thamesport to Swindon (supplier) via freight lorry. Swindon to QEUH via freight lorry.* Disposal | Manufacturing primary products into item.2nd layer of packaging |
| BD | Item raw materials: *synthetic rubber strap*1st layer of packaging: *cardboard box containing a roll of 25 tourniquets. Cardboard inner cylinder.*Transport: *Madrid (Supplier) to Port of Bilboa via freight lorry. Port of Bilbao to London Thamesport via ship. London Thamesport to QEUH via freight lorry.*Disposal | Manufacturing primary products into item.2nd layer of packagingTransport from to and from country of manufacture |
| Daisygrip | Item raw materials: *silicone band, nickel and co-polyester clasp.*1st layer of packaging: *one plastic bag per tourniquet, sticky label and batch sticker, A4 info sheet.*2nd layer of packaging: *cardboard box containing 200 Daisygrips.* *Transport: Wismar (location of manufacture) to Rotterdam Port via freight lorry. Rotterdam Port to Harwich Port via sea ferry. Harwich Port to Tristel Solutions (Supplier) via freight lorry. Tristel Solutions to QEUH via light commercial vehicle.* Disposal  | Manufacturing primary products into item. |
| Clinell wipe | Item raw materials: *Non woven polyester, ammonia*1st layer of packaging: *plastic container*2nd layer of packaging: *cardboard box*Transport: *China (country of manufacture) to London Thamesport via container ship. London Thamesport to QEUH via freight lorry.*Disposal  | Manufacturing primary products into item.Transport from to and from supplier |

Table 2: LCA inclusions and exclusions

## Results

### Environmental impact per tourniquet

Table 3 compares environmental impacts of the single use tourniquets and Daisygrip per use.

#### Global warming potential

From table 3, the Daisygrip has a carbon footprint of 0.0208 kgCO2e per use. 99.8% of these GHG emissions can be attributed to the Clinell wipe (0.0207 kgCO2e), and 0.1% can be attributed to the Daisygrip.

Comparing the GHG emissions of the Daisygrip per use with the single use tourniquets, the Daisygrip has an 57% lower carbon footprint per use than the Vygon, 53% lower than the Medline, and 44% lower than the BD tourniquet.

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|  **Impact category** |  **Unit** | **Environmental impact per use** |
| **Daisygrip (including 1x Clinell wipe)**  | **Single use BD** | **Single use Medline** | **Single use Vygon** |
| Global warming | kg CO2 eq | 0.0208 | 0.0373 | 0.0444 | 0.0487 |
| Stratospheric ozone depletion | kg CFC11 eq | 5.14E-08 | 1.06E-08 | 1.13E-08 | 2.52E-08 |
| Ionizing radiation | kBq Co-60 eq | 7.83E-04 | 1.59E-03 | 1.88E-03 | 1.44E-03 |
| Ozone formation, Human health | kg NOx eq | 5.42E-05 | 9.02E-05 | 1.11E-04 | 1.32E-04 |
| Fine particulate matter formation | kg PM2.5 eq | 2.66E-05 | 4.12E-05 | 5.19E-05 | 6.02E-05 |
| Ozone formation, Terrestrial ecosystems | kg NOx eq | 5.80E-05 | 9.79E-05 | 1.23E-04 | 1.37E-04 |
| Terrestrial acidification | kg SO2 eq | 6.36E-05 | 8.76E-05 | 1.19E-04 | 1.37E-04 |
| Freshwater eutrophication | kg P eq | 6.72E-06 | 9.77E-06 | 1.25E-05 | 1.23E-05 |
| Marine eutrophication | kg N eq | 9.14E-07 | 1.16E-06 | 1.34E-06 | 1.20E-06 |
| Terrestrial ecotoxicity | kg 1,4-DCB | 6.41E-02 | 1.31E-01 | 1.21E-01 | 1.37E-01 |
| Freshwater ecotoxicity | kg 1,4-DCB | 6.43E-04 | 1.49E-03 | 1.37E-03 | 1.56E-03 |
| Marine ecotoxicity | kg 1,4-DCB | 8.67E-04 | 2.03E-03 | 1.86E-03 | 2.10E-03 |
| Human carcinogenic toxicity | kg 1,4-DCB | 1.62E-03 | 2.81E-03 | 3.41E-03 | 3.23E-03 |
| Human non-carcinogenic toxicity | kg 1,4-DCB | 1.49E-02 | 3.69E-02 | 3.44E-02 | 3.63E-02 |
| Land use | m2a crop eq | 7.37E-04 | 1.45E-03 | 1.33E-03 | 1.40E-03 |
| Mineral resource scarcity | kg Cu eq | 6.96E-05 | 1.09E-04 | 1.13E-04 | 1.05E-04 |
| Fossil resource scarcity | kg oil eq | 6.40E-03 | 1.28E-02 | 1.58E-02 | 1.23E-02 |
| Water consumption | m3 | 1.15E-04 | 2.76E-04 | 3.77E-04 | 7.92E-04 |

Table 3: Tourniquet environmental impacts per use

### GHG emission savings

By switching from single-use tourniquets to reusable Daisygrip tourniquets, GGC could save 38,754 kgCO2e a year based on current procurement figures, this is the same as one person flying return from London to Hong Kong 11 times.

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|  | **Uses per year** | **GHG emissions saving per year (kgCO2e)** |
| Switching from single-use BD to Daisygrip  | 320,475 | 5,284.92 |
| Switching from single-use Vygon to Daisygrip  | 80,700 | 2,256.73 |
| Switching from single-use Medline to Daisygrip  | 1,318,800 | 831,212.06 |
| *Total* | *1,719,975* | *38,753.71* |

Table 4: GGC GHG emission savings