

In this article...

- A review of the carbon emissions of products nurses use in their daily practice
- Alternatives to single-use personal protective equipment
- What nurses can do to help the switch from single-use products to reusables

Time to act: what nurses can do to reduce the environmental burden of PPE

Key points

Climate change is a threat to health as well as the planet, and healthcare is a major contributor

If healthcare were a country, it would be the fifth-largest emitter of greenhouse gases on the planet

The greatest opportunity to reduce NHS carbon emissions is decarbonising the supply chain

Increased use of single-use personal protective equipment in response to Covid-19 has significantly worsened the environmental burden of healthcare

Nurses have a key role in building a case for switching from single-use products to reusables, and there are many examples of good practice on which to draw

Author Clare Nash is head of clinical products management, Sandwell and West Birmingham NHS Trust and the Dudley Group NHS Foundation Trust; and member, Sustainable Procurement Forum, NHS England and NHS Improvement.

Abstract Climate change poses a major threat to our health and the planet, and healthcare is a major contributor. Decarbonising the supply chain is critical to achieving carbon reduction and sustainable healthcare, and reusing personal protective equipment is crucial to this. This article considers the impact of Covid-19 on the climate emergency in terms of increased employment of single-use personal protective equipment and what nurses are doing to shift to greener alternatives.

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Delivering sustainable healthcare requires us to use resources wisely, so we can meet the health needs of future generations and preserve the environment and habitats we need for survival (Brundtland, 1987). Yet almost 35 years after Brundtland's groundbreaking report on sustainable development, urgent action is still needed to reverse global environmental degradation and the rising poverty it causes. Behind the devastating waves of the Covid-19 pandemic, an even bigger tsunami threatens our very existence: our environment is changing at an accelerating rate, with direct and immediate health consequences for patients, the public and the NHS (NHS England and NHS Improvement, 2020).

The global healthcare sector is a significant contributor to the climate and health emergency. If healthcare were a country, it would be the fifth largest greenhouse gas emitter on the planet (Healthcare Without Harm, 2019). The NHS faces a serious challenge if it is to achieve its commitment to become carbon neutral by 2050: it needs to remove 31 million tonnes of carbon dioxide

emissions (MtCO_{2e}) from its carbon footprint, which is roughly equivalent to the national carbon footprint of Croatia (NHSE/NHSI, 2020).

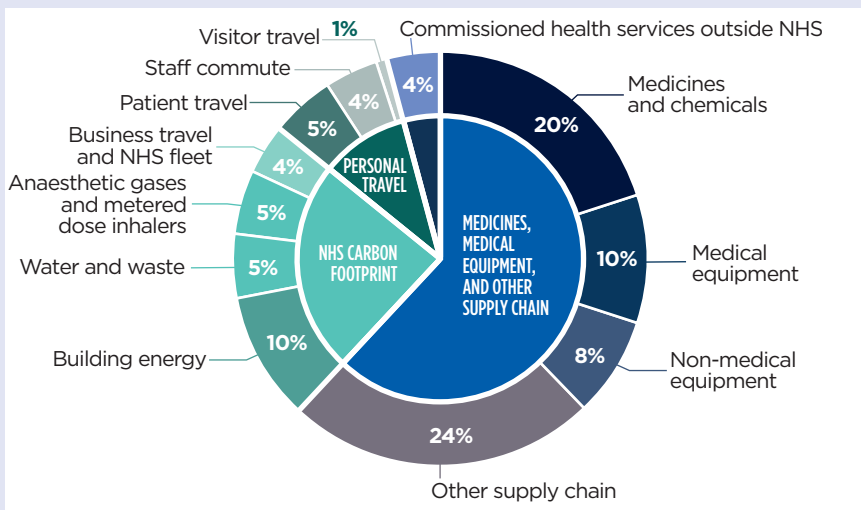
Many of the ways we deliver health and care create harmful waste and bi-products that increase the burden of disease and deplete natural resources (Royal College of Nursing, 2019). Waste and overuse of natural resources has been substantially worsened by the Covid-19 pandemic, throughout which mountains of single-use personal protective equipment (PPE) have been used.

Case for change

In the UK alone, there are 724,516 nurses, midwives, dual registrants and nursing associates (Nursing and Midwifery Council, 2020). As the largest of the health and care workforce, nurses are at the forefront of providing care to communities and people affected by climate change. The NMC code (2018) states that nurses should "be aware of, and reduce as far as possible, any potential for harm associated with practice". As the public's most trusted profession, and mandated by the NMC code, we have a duty to reduce

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Fig 1. Source of carbon emissions



Source: NHS England and NHS Improvement (2020)

Box 1. Top 20 clinical products that emit most greenhouse gases

- Blood sample tubes
- Bandages, dressings and gauzes
- Catheters, tubing and drains
- Clinical waste containers
- Caps, gowns, masks and overshoes
- Carbon dioxide monitor and spirometers
- Crutches, walking sticks
- Disposable incontinence products
- Disposable medical holloware
- Drapes
- Electrode gel
- Examination gloves
- Hearing aids
- Medical packs
- Medical pulp products, such as bedpans and urinals
- Needle-free connection systems
- Polythene aprons
- Patient assessment electronic devices
- Single-use surgical instruments
- Syringes and needles

Source: Sustainable Development Unit (2017)

Table 1. Experimental statistics showing single-use PPE distribution in NHS England^a

PPE item	Previous year (1 Jan-31 Dec 2019), n	Total number used (25 Feb 2020-9 May 2021), n	Likely country of origin ^b
Aprons	161,632,000	1,547,911,000	China, Thailand
Eye protectors	482,000	122,418,000	China
FFP2/3 masks	3,333,000	112,470,000	China, UK, France
IIR masks	18,532,000	1,714,835,000	China, UK, Mexico
Gloves	1,763,164,000	6,954,427,000	Malaysia
Gowns	2,048,000	22,547,000	China, UK

PPE = personal protective equipment.

^aSource: Department of Health and Social Care (2021); ^bSource: Rizan et al (2021)

our own carbon emissions and help employers and colleagues be more environmentally aware of their actions and reduce their emissions.

Sustainability in the NHS has traditionally been an estates role, focusing on cutting energy use, water and waste but the

greatest way to reduce carbon emissions is to decarbonise the supply chain (Fig 1). As most NHS greenhouse gas emissions stem from the products nurses use in their daily practice, this includes reducing pharmaceuticals use and use/reuse of medical devices and clinical products.

Many of the interventions promoted in NHS England and Improvement's (2020) *Delivering a Net Zero National Health Service* report are based on moving from a linear wasteful economy, in which the resources we use result in non-recyclable waste, to a circular one, in which all waste is recycled. As well as reusing materials and reducing waste, circular economies can also extend the useful life of products.

In 2017, the NHS's Sustainable Development Unit (SDU) identified the top 20 products used in healthcare that emit most greenhouse gases (Box 1); PPE featured in the list three times. PPE use has been a central behavioural and policy response to control the spread of the SARS-CoV-2 virus during the global Covid-19 pandemic (Rizan et al, 2021). The carbon footprint of all PPE supplied to health and social care services in England between 25 February and 23 August totalled 106,478 tonnes CO₂e. This equated to 26,662 times the global average person's carbon footprint during a six-month time period (Rizan et al, 2021). Per day, this equates to around 244 return flights from London to New York (Rizan et al, 2021; Department for Environment, Food and Rural Affairs/ Department for Business, Energy and Industrial Strategy, 2019).

With the second wave of hospital admissions due to the pandemic larger than the first, and PPE supply improved, it can be assumed that PPE use and associated emissions were even greater in the second wave. The ongoing, accumulating environmental impact of single-use PPE requires urgent action from government, and needs nurses to step up and lobby for a sustainable solution.

During the pandemic, this supply has been free for the NHS, GPs and social care, but is not free to the UK taxpayer and places a significant burden on planetary resources (Table 1). As well as the drain on raw material resources, there are also longstanding concerns about abuse of workers manufacturing masks and gloves (Bhutta, 2017), including migrant workers in factories producing gloves in Malaysia (Miller, 2020).

What can nurses do?

Nurses need PPE that is:

- Designed and certified as safe for reuse;
- Sourced and manufactured locally using sustainable materials;
- Used, reused and then recycled at the end of its life to mitigate the deleterious effects on planetary health.

Single-use PPE is free, but reusing PPE (particularly gowns) has a decontamination

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Table 2. Good PPE practice: examples of organisations implementing or piloting initiatives

PPE item	Organisation(s)	Initiative
Reusable non-sterile gowns	● Northampton General Hospital NHS Trust ● Sandwell and West Birmingham NHS Trust ● University Hospitals Birmingham NHS Foundation Trust	Gowns go with linen for washing and are returned for reuse (up to 75 times). Promotes a circular economy and reduces transport emissions if sourced globally
Reusable half-face mask respirators (instead of FFP3 masks)	Sandwell and West Birmingham NHS Trust ● Dudley Group NHS Foundation Trust ● North Lincolnshire and Goole NHS Foundation Trust ● Countess of Chester Hospital NHS Foundation Trust	Staff are allocated their own reusable mask, each saving three to five FFP3 masks per shift. Staff need only be fit tested for the mask once, not each time a new FFP3 mask is supplied by the central PPE team, saving staff time
Reusable IIR masks	● Yorkshire Ambulance Service ● Tower Hamlets GP practices ● Sandwell and West Birmingham NHS Trust	Infection prevention and control challenges are navigated, ensuring European Standards and certification meets requirements for reuse. Potential to save 66,000 tonnes of mask waste per year (Allison et al, 2020)
Eye protection/goggles	● University Hospitals Birmingham NHS Foundation Trust	Staff remove items safely and decontaminate with a disinfectant wipe after use. This method was approved when PPE was in short supply and could be continued if products made for reuse
Gowns, theatre caps	● Northampton General Hospital NHS Trust	Reuse of sterile and non-sterile gowns and theatre caps through linen contract
Gloves	GOSH ● University Hospitals Birmingham NHS Foundation Trust ● Royal College of Nursing programme lead	Staff only wear if handling chemicals or at risk of contact with blood or body fluids
Single-use IIR masks drapes and gowns	● Aneurin Bevan University Health Board ● Royal Cornwall Hospitals NHS Trust	Waste (IIR masks, drapes and gowns) segregated to enable melting of masks for reuse as polypropylene building blocks
Visors	● The Royal Wolverhampton NHS Trust	Manufactured 250,000 visors using redeployed staff; sourced products locally, reducing transport emissions, while ensuring labour standards were met. Manufacturing PPE in the UK reduces PPE carbon footprint by 12% (Rizan et al, 2021)

GOSH = Great Ormond Street Hospital for Children NHS Foundation Trust; PPE = personal protective equipment.

cost that trusts have to pay; this disincentivises moving to reusables. To strengthen the case for reusables, speak with your estates teams to calculate costs saved by reducing associated waste. Ask to see your trust or employer's green plan. Some healthcare providers are further ahead with their net-zero green plans than others and these plans have supported their move to sustainable PPE solutions, despite the additional costs. You could also approach your trust finance teams about re-directing spend, which would have been allocated to pre-Covid-19 budgets for PPE, to fund reusables.

Table 2 highlights some areas of good practice and proposals that nurses can make to their procurement, finance, estates and sustainability leads, if such processes are not yet in place at their trust.

Way ahead

With the UK hosting the United Nations Climate Change Conference (COP 26) in November, the NHS cannot afford to wait to act. We must all commit to protecting our planet and its people to ensure a greener, more-resilient future for us all. It is easy to

feel overwhelmed by the scale of the global crisis, to feel helpless and to say it is too difficult and there is no point doing anything because small changes will not make a difference. But, during this pandemic, we have shown what a resilient, determined workforce we can be. As 2020 was the year of the nurse; let's make 2021 the year nurses turn the tide on climate change. **NT**

- Clare Nash works with the Royal College of Nursing on resources that support nurses to deliver greener healthcare.

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