

Sustainability in critical care

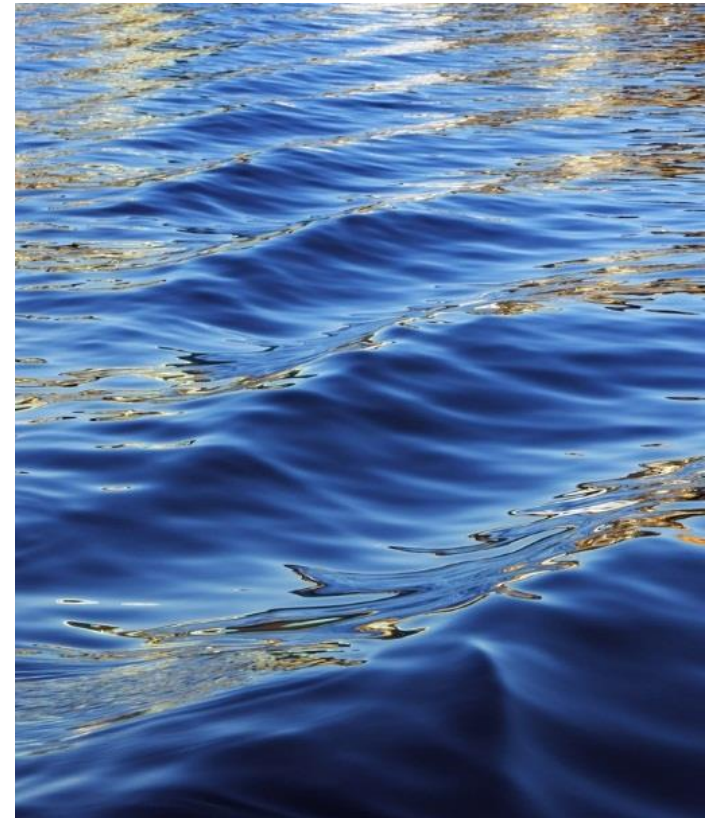
Dr Heather Baid

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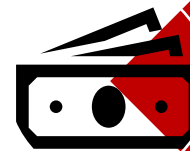
Sustainable healthcare practice



Quality care



Social



Financial



Environmental

Satisficing = satisfy + suffice

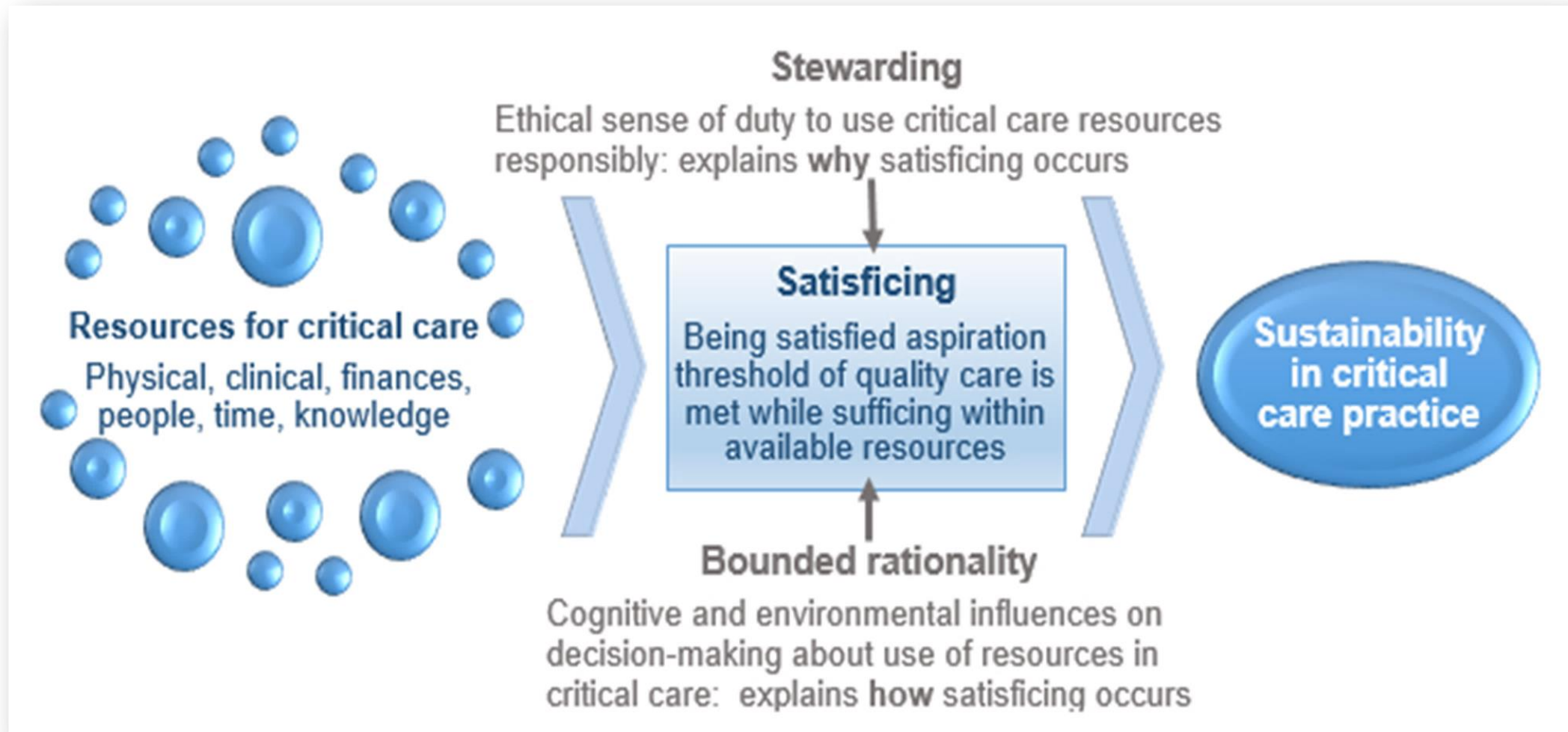
- Being **satisfied** that person-centred, quality healthcare is achieved while **sufficing** with the minimum amount of financial, environmental and social resource

(Baid 2019, 2021; Simon 1997)



Satisficing for sustainability in critical care practice: a constructivist grounded theory

PhD Thesis – University of Brighton (Baid 2019)



Social sustainability

Staff health and wellbeing

- Healthy staff with job satisfaction are an important resource for sustainable healthcare
- Critical view of resilience: personal resilience vs organisational / system resilience

(Baid 2018; Traynor 2017, 2018; Turner 2014)





Social sustainability and ethical procurement

Human rights and fair trade in healthcare supply chain

See video on YouTube:
Human cost of healthcare



British Medical Association

Ethical Procurement for General Practitioners and Clinical Commissioning Groups

Ensuring the protection of Labour rights in medical supply chains

 Royal College of General Practitioners

 MEDICAL FAIR & ETHICAL TRADE GROUP

 BMA

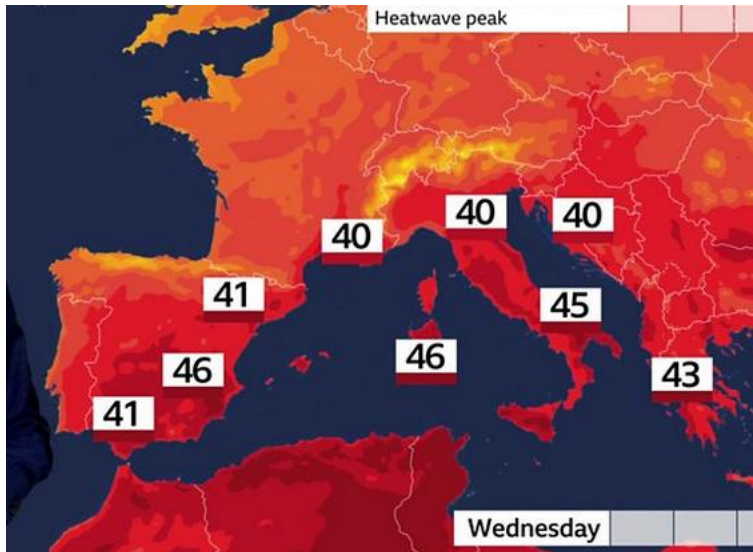
Financial sustainability



A high-resolution image of Earth from space, showing the continents of Africa and Europe. The Earth is illuminated from the right, creating a bright blue glow along its horizon. The background is a dark, star-filled space.

What does planetary health have to do with critical care?

Planetary health crisis



Heat waves
Drought
Storms
Fires
Floods

Planetary health crisis

Canada wildfires: At least 30,000 households in British Columbia told to evacuate

© 20 August



Flooded London hospitals ask patients to stay away

© 26 July 2021 · [Comments](#)



Planetary health crisis

🕒 SEPTEMBER 8, 2023

**UK experiencing longest
September heat wave**

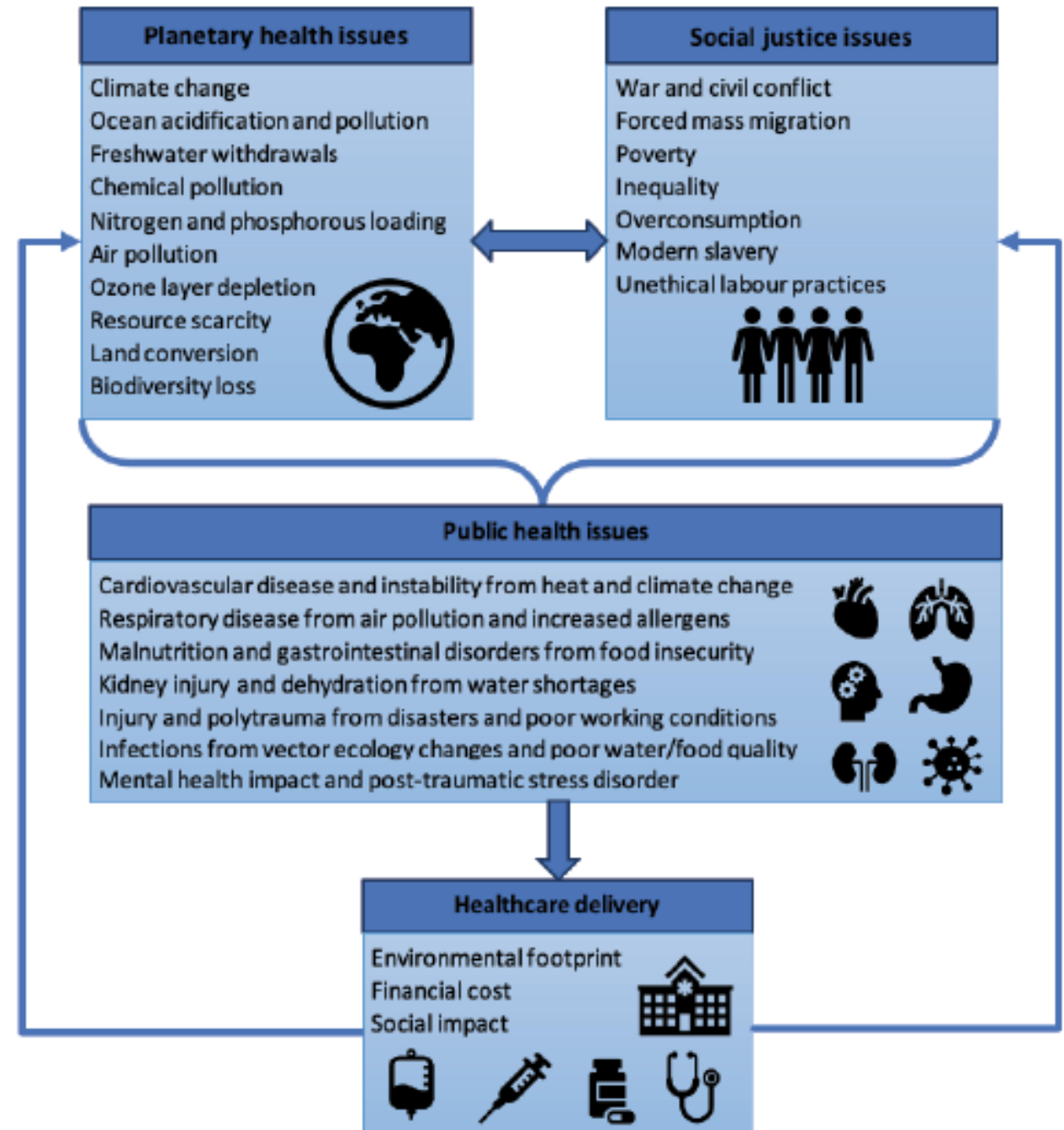


Environmental sustainability issues

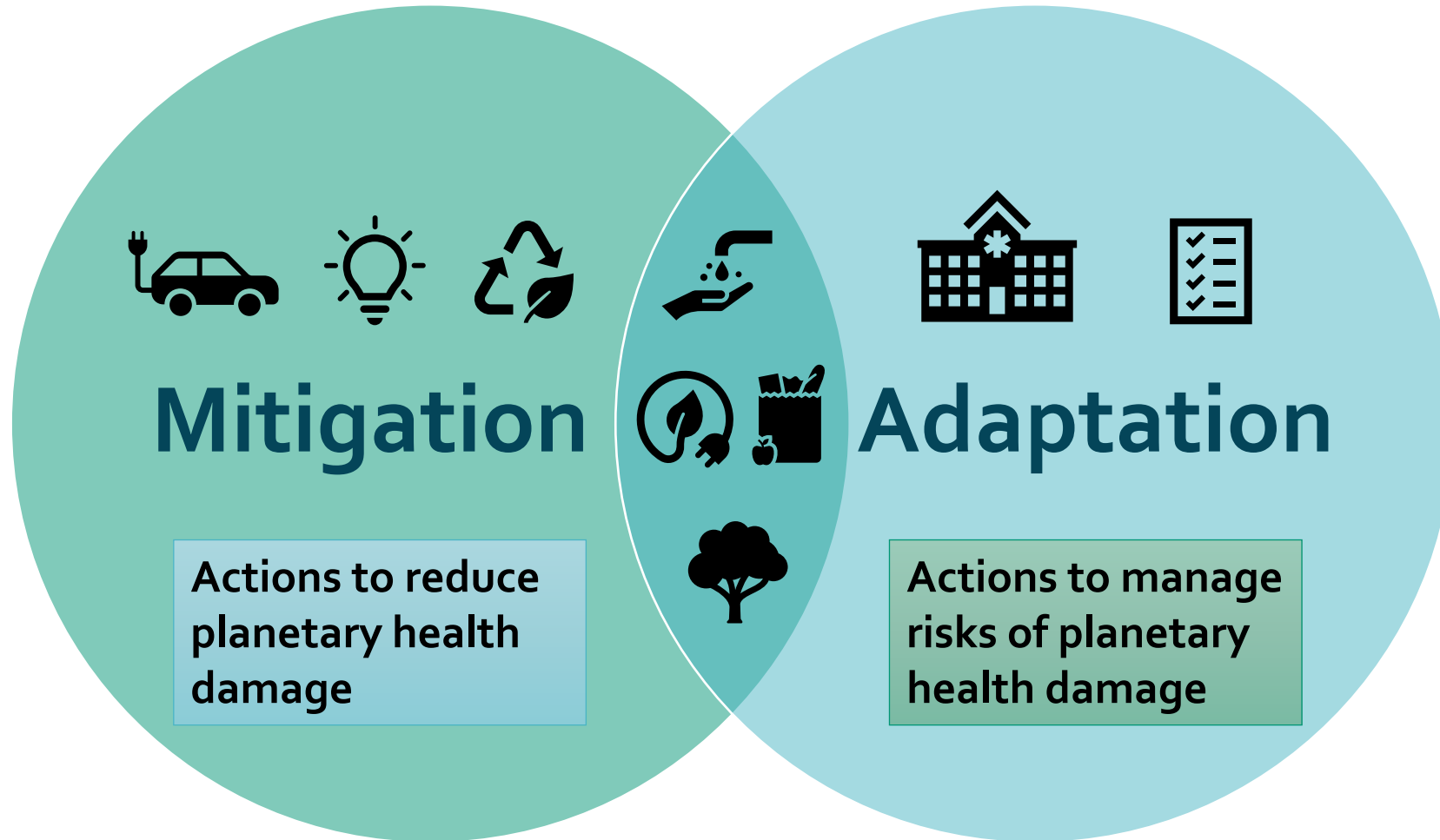


Planetary health Social justice Public health Healthcare delivery

Parry-Jones, J. and Baid, H., 2023.
Moving environmental sustainability
from the fringe to the centre ground in
critical care. *ICU Management &
Practice*, 23(3), pp.110-113.



Preventing and adapting to planetary health crisis



A high-resolution image of Earth from space, showing the continents of Africa and Europe. The Earth is illuminated from the right, creating a bright blue glow along its horizon. The background is a dark, star-filled space.

What is the environmental impact of health care?

Health sector footprint

- Healthcare climate footprint = 4.4% of global net emissions
- If healthcare was a country, it would be the 5th largest emitter of greenhouse gases



HEALTH CARE'S CLIMATE FOOTPRINT

HOW THE HEALTH SECTOR CONTRIBUTES TO THE GLOBAL CLIMATE CRISIS AND OPPORTUNITIES FOR ACTION

Health Care
Without Harm

ARUP

Health Care Without Harm
Climate-smart health care series
Green Paper Number One

Produced In collaboration with Arup
September 2019

The image shows the cover of a report. The top half features a photograph of a narrow, flooded street in a densely populated urban area, likely a slum. People are wading through the water. Overlaid on the right side of the photo is a large, white, stylized medical symbol (a caduceus). The bottom half of the cover is white and contains the report's title, subtitle, logos for 'Health Care Without Harm' and 'ARUP', and publication information.

The carbon footprint of treating patients with septic shock in the intensive care unit

Forbes McGain, Jason P Burnham, Ron Lau, Lu Aye, Marin H Kollef and Scott McAlister

Critical Care and Resuscitation • Volume 20 Number 4 • December 2018

- **Life cycle assessment of care for ICU patients with septic shock:**
 - Energy, machines, consumables, waste
- 10 patients in US and 10 patients in Australia
- Energy made up a significant proportion of carbon footprint but relied on coal:
 - US electricity mix – 88% black coal, 5% natural gas, 7% renewable
 - Australia electricity mix – 86% brown coal, 4% natural gas, 10% renewable

Averages	US-ICU	Aus-ICU
Energy (kWh/day)	272	143
Single use items (kg/day)	3.4	3.4
Carbon footprint (kg CO ₂ -e/day)	178	88
Energy contribution to carbon footprint (%)	87	76
Equivalent total daily carbon footprint of 1 ICU patient with septic shock	3.5 Americans	1.5 Australians

Environmental footprint of ICU

Prasad, P.A., Joshi, D., Lighter, J., Agins, J., Allen, R., Collins, M., Pena, F., Velletri, J. and Thiel, C., 2022. Environmental footprint of regular and intensive inpatient care in a large US hospital. *The International Journal of Life Cycle Assessment*, pp.1-12. <https://doi.org/10.1007/s11367-021-01998-8>

- Life cycle assessment comparing the daily environmental footprint of acute inpatient unit with ICU
- Acute inpatient unit – 49 beds
- ICU – 12 beds
- Single tertiary private hospital in US

	Acute inpatient unit	Intensive care unit
Solid waste (kg/day)	5.5	7.1
Carbon footprint (kg CO ₂ -e/day)	45	138

Biggest contributors:

Consumables, building energy, capital equipment, food services, and staff travel

Material flow analysis and hotspots

Hunfeld, N., Diehl, J. C., Timmermann, M., van Exter, P., Bouwens, J., Browne-Wilkinson, S., de Planque, N., & Gommers, D. (2023). Circular material flow in the intensive care unit-environmental effects and identification of hotspots. *Intensive care medicine*, 49(1), 65–74. <https://doi.org/10.1007/s00134-022-06940-6>

- Evaluation of one Dutch intensive care unit
- 56 beds mixed medical-surgical ICU
- 2839 patients admitted to ICU in 2019
- Average length of stay = 4.6 days

- **Material mass inflow/year = 247,000 kg**
- **Incinerated waste/year = 50,000 kg**
- **Environmental impact/patient daily:**
 - 17 kg mass
 - 12 CO₂-e (did not include energy)
 - 300 L water usage

Environmental hotspots:

Non-sterile gloves, isolation gowns, bed liners, surgical masks and syringes (including packaging)

Healthcare life cycle assessment database

<https://healthcarelca.com/database>

HealthcareLCA

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Primum non nocere

*A DATABASE OF
ENVIRONMENTAL
ASSESSMENTS WITHIN
HEALTHCARE*

[Explore database](#)



A high-resolution satellite-style image of Earth from space, showing the African continent and surrounding oceans. The image is split horizontally by a white banner containing text. The top half shows the northern part of Africa, the Middle East, and parts of Europe and Asia, with some cloud cover. The bottom half shows the southern part of Africa, the Indian Ocean, and the southern part of the Atlantic Ocean, with more extensive cloud cover. The Earth is set against a dark, starry background of space.

Policy and strategy for environmental sustainability

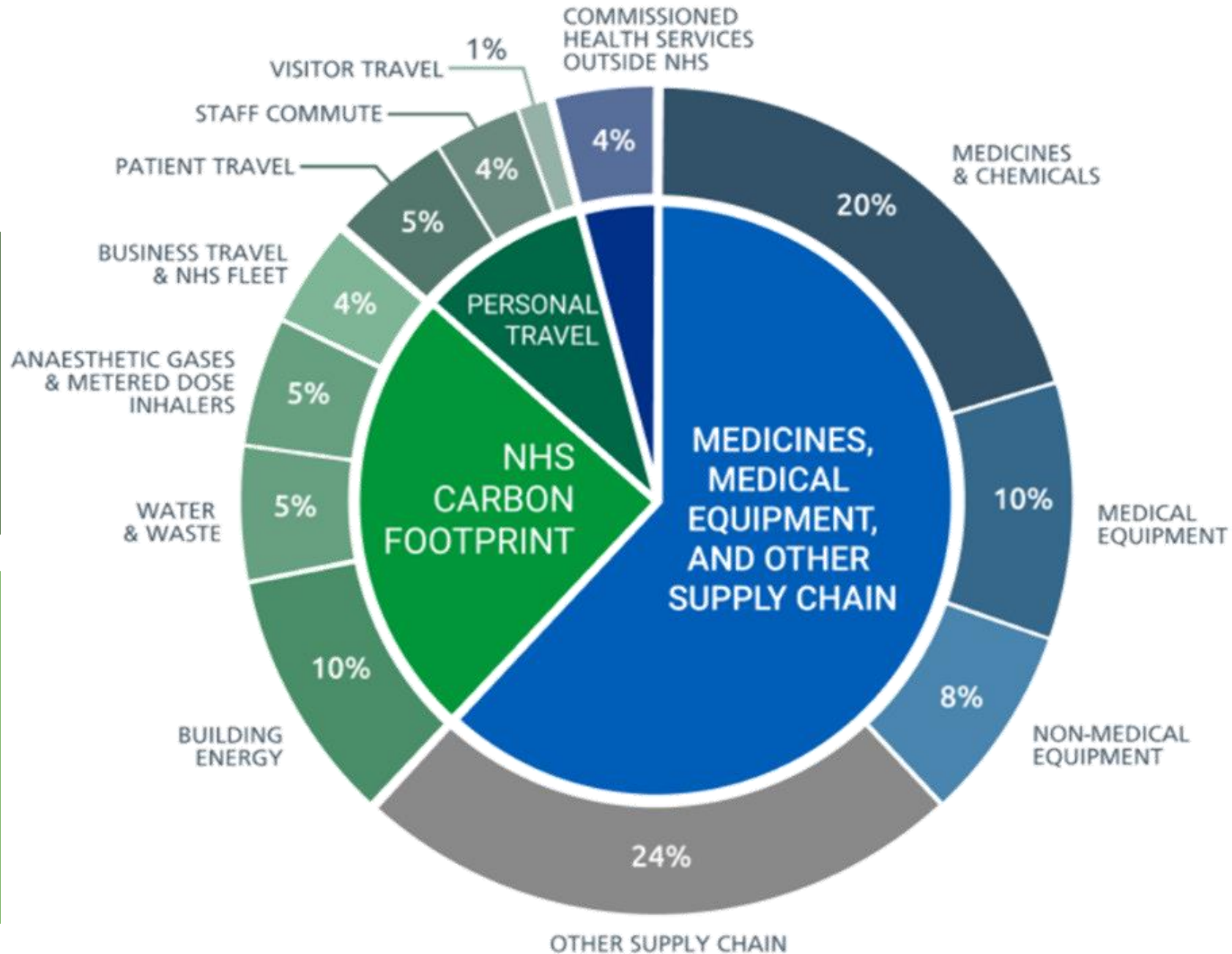
NHS England Carbon footprint



Delivering a 'Net Zero'
National Health Service



Health and Care Act 2022



NHS Wales

NHS Wales Decarbonisation Strategic Delivery Plan

2021-2030



GIG
CYMRU
NHS
WALES

Partneriaeth
Cydwasaethau
Shared Services
Partnership

NHS Scotland



ABOUT

AREAS OF FOCUS

OUR STRATEGY

CONFERENCE

CONTACT

Our NHS Our People Our Planet

We champion sustainability for a healthier NHSScotland



WHO Budapest Declaration – July 2023

- Signed by ministries across Europe as a commitment to address health dimensions of triple environmental crisis:
 1. Climate crisis
 2. Biodiversity loss
 3. Environmental pollution
- Aiming to make health care systems and facilities climate resilient and environmentally sustainable
- Aligned to COP Health Programme – regional community of practice of European countries working together
- UK also signed up for a new [Environment and Health Process \(EHP\) Partnership for Health Sector Climate Action](#)

Need for more research and education about sustainable healthcare was a theme throughout the WHO-Europe 7th Ministerial Conference on Environment and Health

COP Health Programme

- Promoting change to protect the health of people and the planet including:
 - Building climate resistant health systems
 - Developing low carbon sustainable health systems
 - Adaption research for health
 - Inclusion of health priorities in Nationally Determined Contributions
 - **Raising the voice of health professionals as advocates for stronger ambition on climate change**





Statement on environmental sustainability

The BACCN recognises that the climate emergency is a health emergency.

A background image showing a dense forest of tall, thin trees, likely evergreens, with their branches and leaves silhouetted against a light sky. The image is slightly blurred and has a dark, muted color palette.

Climate Emergency is a Health Emergency

A high-resolution image of Earth from space, showing the continents of Africa and Europe. The Earth is illuminated from the right, creating a bright blue glow along its horizon. The background is a dark, star-filled space.

Putting policy into actions for sustainable critical care

1. PREVENTION

promoting health and preventing disease by tackling the causes of illnesses and inequalities

3. LEAN SERVICE DELIVERY

streamlining care systems to minimise wasteful activities

Four principles of **SUSTAINABLE HEALTHCARE**

Mortimer, F. *The Sustainable Physician*. Clin Med 10(2). April 1, 2010. p 110-111.

<http://www.clinmed.rcpjournals.org/content/10/2/110.full>

2. PATIENT SELF-CARE

empowering patients to take a greater role in managing their own health and healthcare

4. LOW CARBON ALTERNATIVES

prioritising treatments and technologies with a lower environmental impact.



CENTRE *for*
**SUSTAINABLE
HEALTHCARE**
inspire • empower • transform



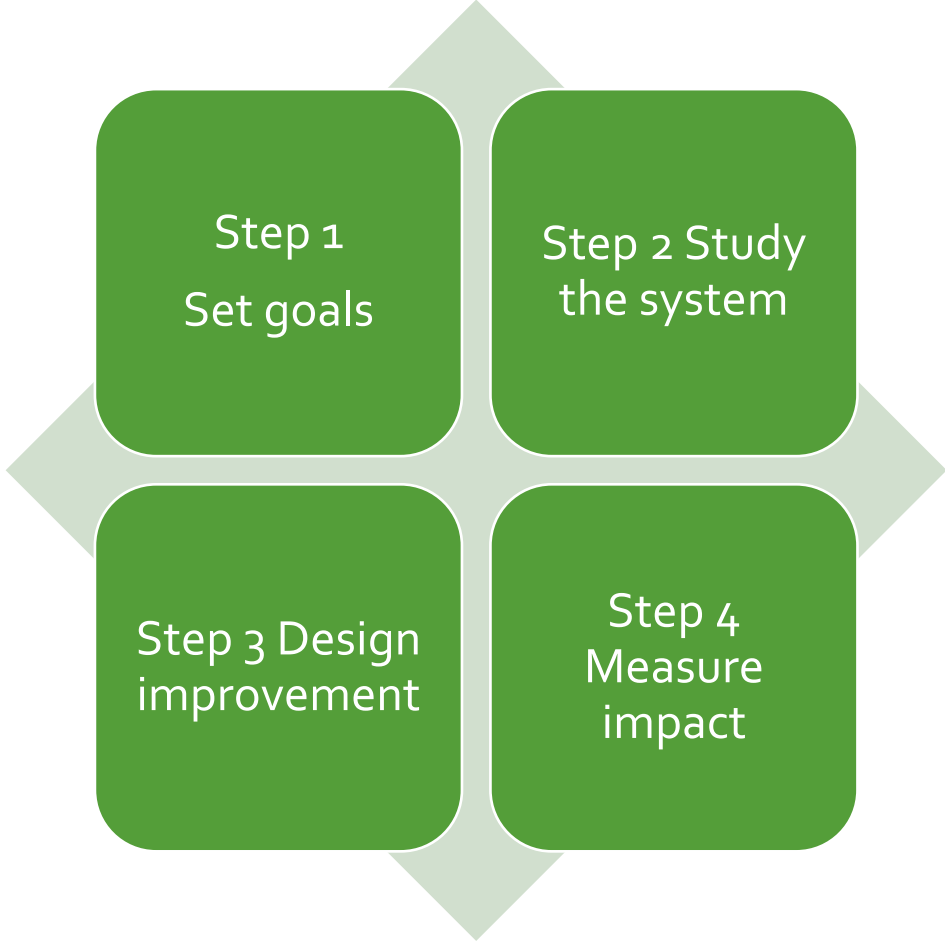
SusQI framework



CENTRE for
SUSTAINABLE
HEALTHCARE



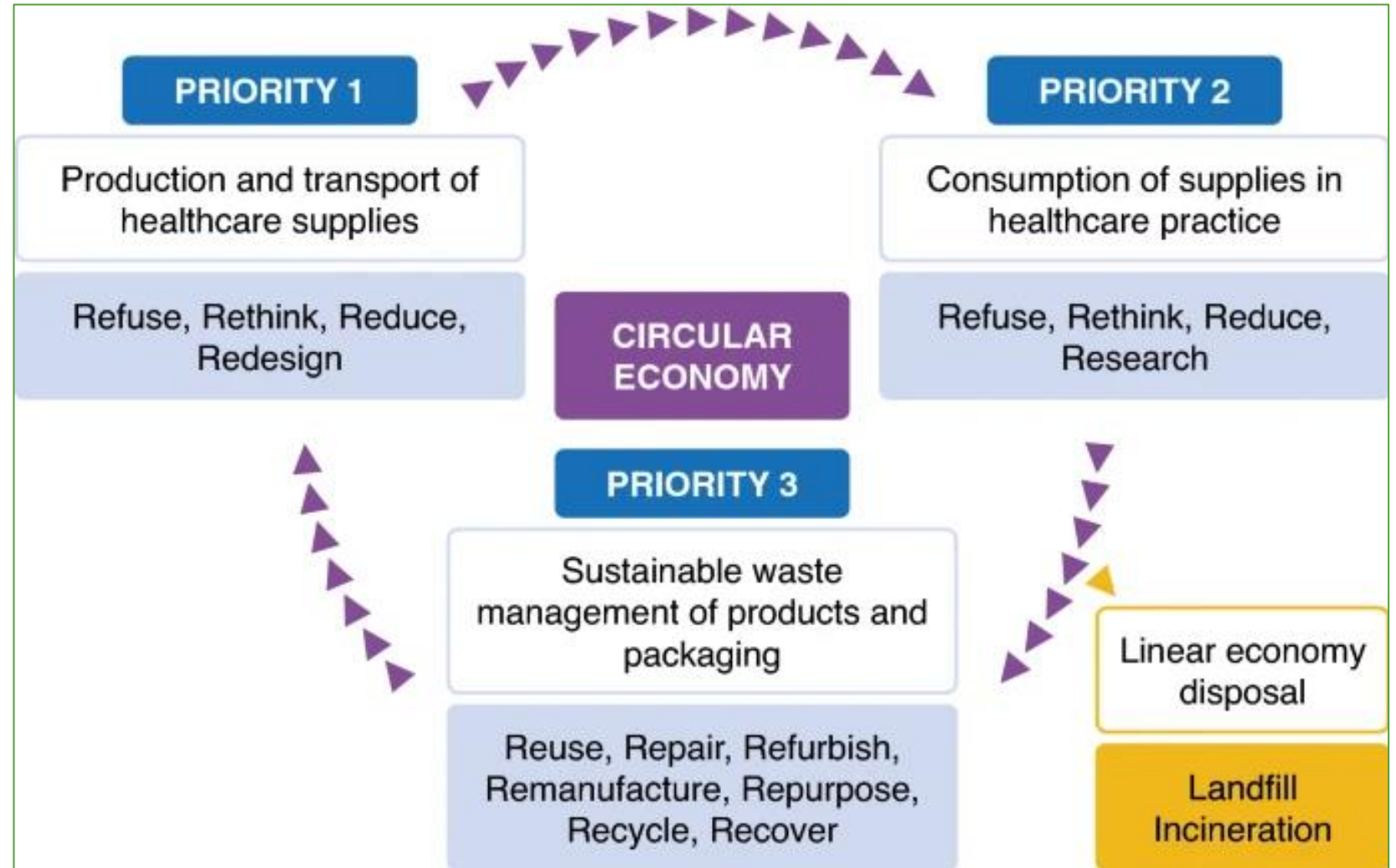
- Sustainability within a quality improvement model
- Free resources and case studies on SusQI website
- Combines health, financial, environmental and social outcomes within QI process



Circular economy principles



Barbariol, F., Baid, H.2023. Introduction to an intensive care recycling program. *Intensive Care Medicine* 49(3): 327–329.



If it can't be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned or removed from production.

— Pete Seeger —

Avoid – Reduce – Reuse – Recycle – Rethink – Research

Baid, H., Damm, E., Trent, L. and McGain, F., 2023. Towards net zero: critical care. *BMJ*, 381:e069044

Reducing the environmental footprint of critical care will require a committed effort by many stakeholders. This graphic presents a framework for environmental sustainability, which can help us reduce our use of energy, pharmaceuticals, and single-use consumables in critical care



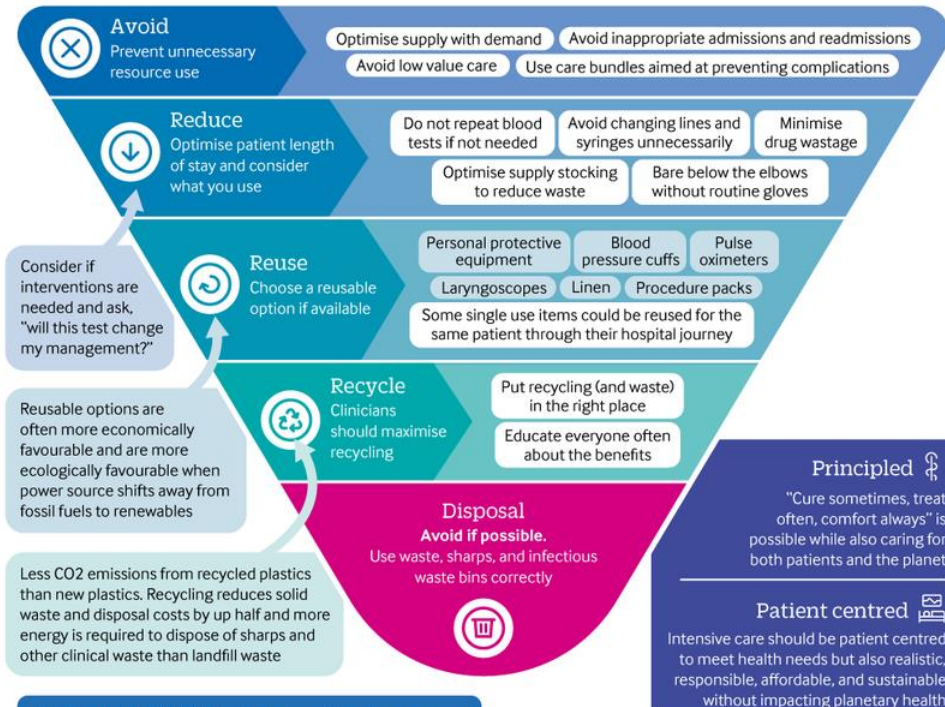
Why is critical care a carbon hotspot?

- Most important contributor** Energy for heating, ventilation, and air conditioning
- Critical care rooms have higher airflow rates
- Critical care is always active
- Greater use of consumables and drugs

What can I do?

Consider how to reduce your intensive care unit's impact on the environment holistically. Follow the diagram below, from top to bottom in terms of importance

- Rethink** Create an intensive care mindset of rethinking sustainability and role model at the bedside. People are the essential component to changing systems
- Less is more** Research suggests that "doing less" in intensive care can improve patient health outcomes while bringing environmental sustainability co-benefits



thebmj Read the full article online <https://bit.ly/bmj-nz-icu>

See more visual summaries <http://www.bmj.com/infographics>

Environmental Sustainability in Canadian Critical Care:

A Nationwide Survey Study on Medical Waste Management

*Alec Yu and *Iman Baharmand

Healthcare Quarterly Vol.23 No.4 2021

- National survey via Canadian Critical Care Network
- 81 ICUs responded out of 286 hospitals in Canada (28.3%)

Sustainability initiatives in intensive care units

- Reduction of stocking quotas of disposable equipment
- Reusing items after decontamination
- Recycling non-medical equipment
- Moving supply carts/nursing carts outside rooms
- Systemic change to ordering, organisation, arrangement

Barriers to sustainability in intensive care units

- Lack of buy-in from frontline staff
- Infection prevention and waste management policies

Case – 16 bedded ICU

Unused supplies discarded

- \$140-\$170 / patient
- \$140,000 / year
- 3,715 kg of waste

Intervention

80% reduction in waste of unused items

\$110,000 annual savings

ICU recommendations – practical examples

ICU sustainability teams and champions working with estates and procurement

Paracetamol
IV > NG

Antimicrobial
resistance
programmes

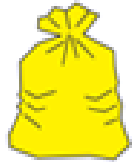
ABCDEF
bundle

Reducing
unnecessary
tests & drugs

Reusable
supplies



Recycling and waste segregation



ICS and IPS – Gloves posters

GLOVES OFF
in critical care



You don't need to wear gloves when preparing most IV drugs



>100 disposable gloves used per patient every day in ICU.¹

Be glove aware and only wear them when you need to.

You don't need to wear gloves for IV drug preparation unless you're preparing cytotoxic drugs or monoclonal antibodies.

Endorsed by



[ics.ac.uk/sustainability](https://www.ics.ac.uk/sustainability)

¹Hunfeldt N et al (2022) Intensive Care Med 48, 66-74;

GLOVES OFF
in critical care



You don't need to wear gloves for routine patient examinations



>100 disposable gloves used per patient every day in ICU.¹

Be glove aware and only wear them when you need to.

When there is no risk of exposure to blood, body fluids, or hazardous substances, you don't need to wear gloves.

Endorsed by



[ics.ac.uk/sustainability](https://www.ics.ac.uk/sustainability)

¹Hunfeldt N et al (2022) Intensive Care Med 48, 66-74;

GLOVES OFF
in critical care



Before you reach for gloves stop and ask 'Am I at risk?'



The risks requiring you to wear gloves at work are:

- 1 If direct contact with blood, bodily fluids, mucous membranes or non-intact skin is likely
- 2 If contact with chemical hazards is likely
- 3 If caring for a patient requiring specific transmission-based precautions (check your local policy)*

Unnecessary glove use contributes to environmental damage and skin damage, and it disrupts good hand hygiene practice.

Be glove aware and only wear them when you need to.

Endorsed by



*With credit to Sam Clark and the team at Wirral University Teaching Hospitals NHS Foundation Trust
<https://sway.office.com/Sc6HkqSAs4mXeQI5?ref=Link>

[ics.ac.uk/sustainability](https://www.ics.ac.uk/sustainability)

A high-resolution satellite-style image of Earth from space, showing the continents of Africa, Europe, and Asia. The Earth is set against a dark, star-filled background. A white horizontal bar is overlaid across the center of the image, containing the text.

Resources for sustainable critical care

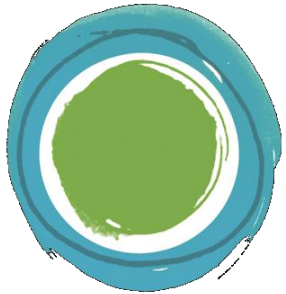
WHO GUIDANCE FOR CLIMATE-RESILIENT AND ENVIRONMENTALLY SUSTAINABLE HEALTH CARE FACILITIES



A beginners guide to **Sustainability** in the ICU



Critical Care Susnet



Join in the conversation!

Create a post

Create a resource

Create an event

- Free online network hosted by Centre for Sustainable Healthcare and supported by Intensive Care Society and British Association of Critical Care Nurses
- Online discussion board – ask questions, share experiences, advertise events
- Bi-monthly sharing hours (free on Zoom) – speakers + open discussion
- <https://networks.sustainablehealthcare.org.uk/critical-care-sustainability-network/>



Nurses Climate Challenge EUROPE

- Campaign for nurses to educate colleagues about climate change and human health
- Networking and resources

NURSING SCHOOL COMMITMENT

NURSES CLIMATE CHALLENGE EUROPE



NIHR – Climate change and sustainability

Sustainable health and care

[‘Delivering a Sustainable Health and Care System’](#).

The evidence produced will support practical, real-world solutions for health and care systems.

sustainability@nihr.ac.uk

Current funding opportunities

- [Research and Innovation for Global Health Transformation call](#) (closed on 29 June 2022)
- [Delivering a Sustainable Health and Care System Themed Call](#) for NIHR domestic programmes
- James Lind Alliance Priority Setting Partnership on [Greener Operations: Sustainable Peri-Operative Practice](#)

NHS Health Research Authority environmental sustainability strategy

The NHS Health Research Authority (HRA) is an important partner in UK health and care research. Its environmental sustainability strategy: Making environmental sustainability the norm, outlines ways to meet the challenges of climate change.



GREater ENvironmental sustainability in Intensive Care Units

- Multi-disciplinary initiative aiming to develop evidence-based guidance for reducing the environmental footprint of intensive care practice
- blogs.brighton.ac.uk/sustainablecriticalcare





Intensive Care Medicine



Collection

My Green ICU

Submission status	Open for submission from	Submission deadline
Open	20 December 2022	Ongoing

Healthcare pollutes the earth's air, land, and water, contributing approximately 5% of worldwide anthropogenic greenhouse gases (GHGs). Critical care medicine is a hospital carbon hotspot with continuous staff activity, resource use, and energy demands. Some studies and suggestions from intensive care societies provide helpful guidance for critical care physicians keen to commence with practical measures to reduce their ICU carbon footprint. We complement such advice with a suite of sustainability strategies to be introduced by expert contributors in Intensive Care Medicine. ICM is committed to planning a greener and more sustainable ICU environment for the future. — [show less](#)

Special issue

The logo for BAICN (British Association of Intensive Care Nurses) features the acronym 'BAICN' in blue, with a green circular graphic element behind the 'I'. Below the acronym, the full name 'British Association of Intensive Care Nurses' is written in a smaller font. To the right of the logo, the text 'Nursing in Critical Care' is displayed in a large, bold, blue font. The entire logo and text are set against a white background with a blue and green decorative element on the right side.

BAICN Nursing in Critical Care

- Nursing in Critical Care journal will be publishing a special issue on environmental sustainability
- Submission deadline extended until **1 Dec 2023**
- Consider publishing an article!

People Power

Right now, eight million tonnes of plastics end up in the oceans every year...the actions of just one of us may seem to be trivial and to have no effect. But the knowledge that there are thousands, hundreds of thousands of people who are doing the same thing – that really does have an effect.

DAVID ATTENBOROUGH

EVERYDAYPOWER



Global warming will not end by
Earth finding a shade under the trees
but under our hands joined together.

Agona Apell

Imagining sustainability

Imagine a machine that uses solar energy to remove carbon from the air and turns it into a beautiful, strong and sustainable building material.



Oh wait...that's what trees are.

Imagine a person who can effectively troubleshoot concurrent complex problems, while simultaneously using technical and non-technical skills as a safety-critical professional.

Oh wait...that's what critical care nurses are.

And there are a lot of us!

