Sustainable by Design: Taking a Care Pathways Approach to Decarbonising Healthcare and Assessing Value

Public symposium - Espoo, Finland

11/09/2026

Funded by the European Union

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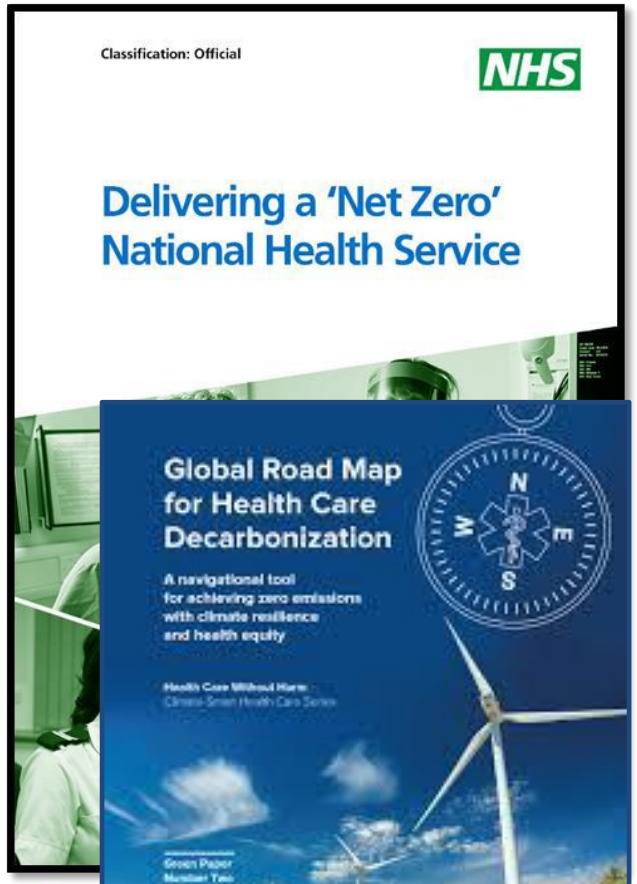
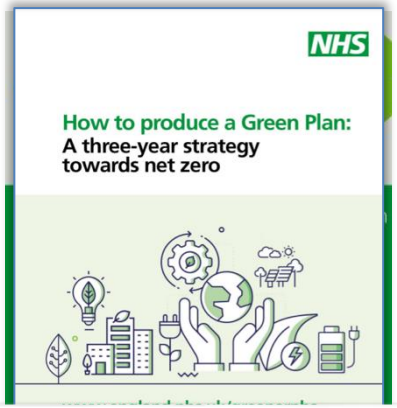
Dr Fiona Adshead; Chair; Sustainable Healthcare Coalition

Net Zero: the inevitable future of healthcare

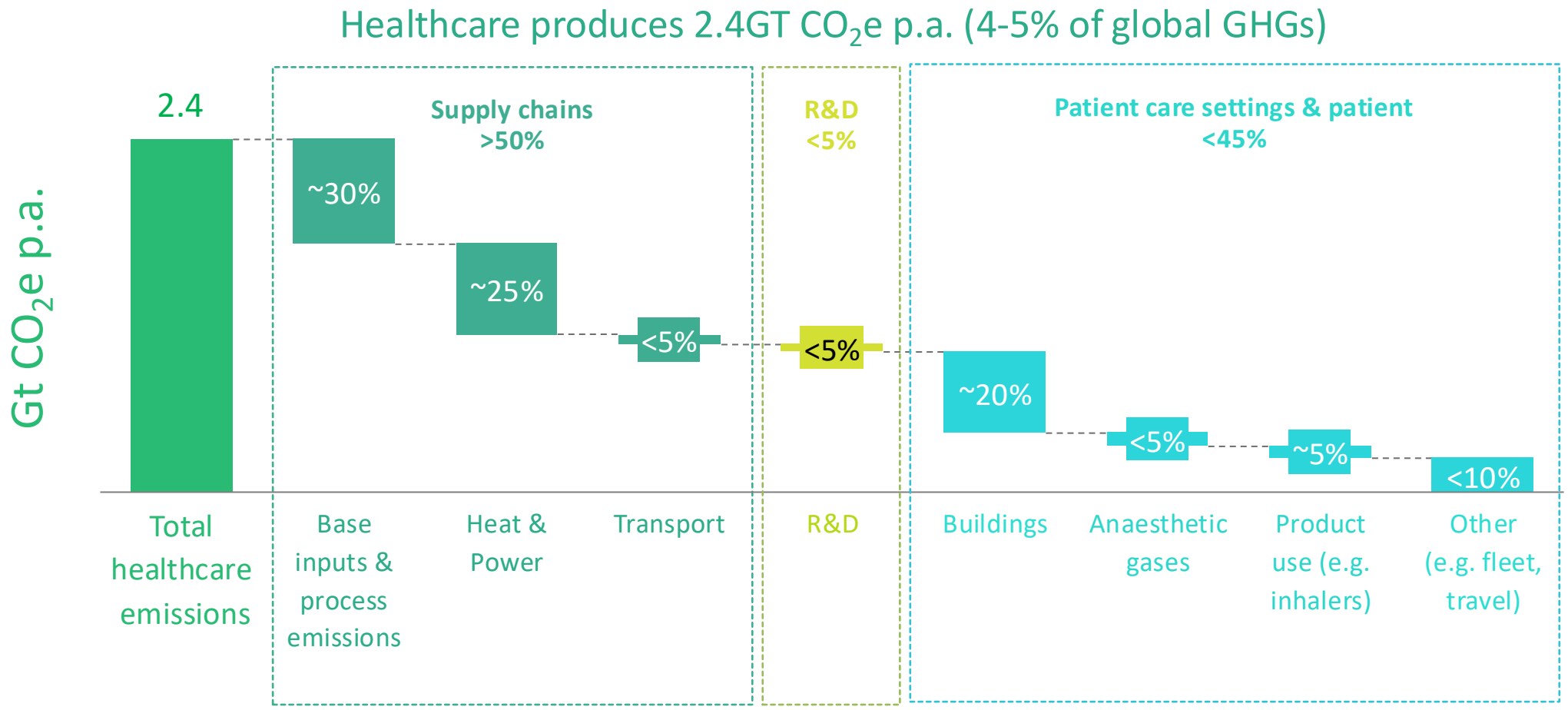




Sustainable Healthcare Coalition

TransPharm: Public Symposium Espoo : 11th September 2026

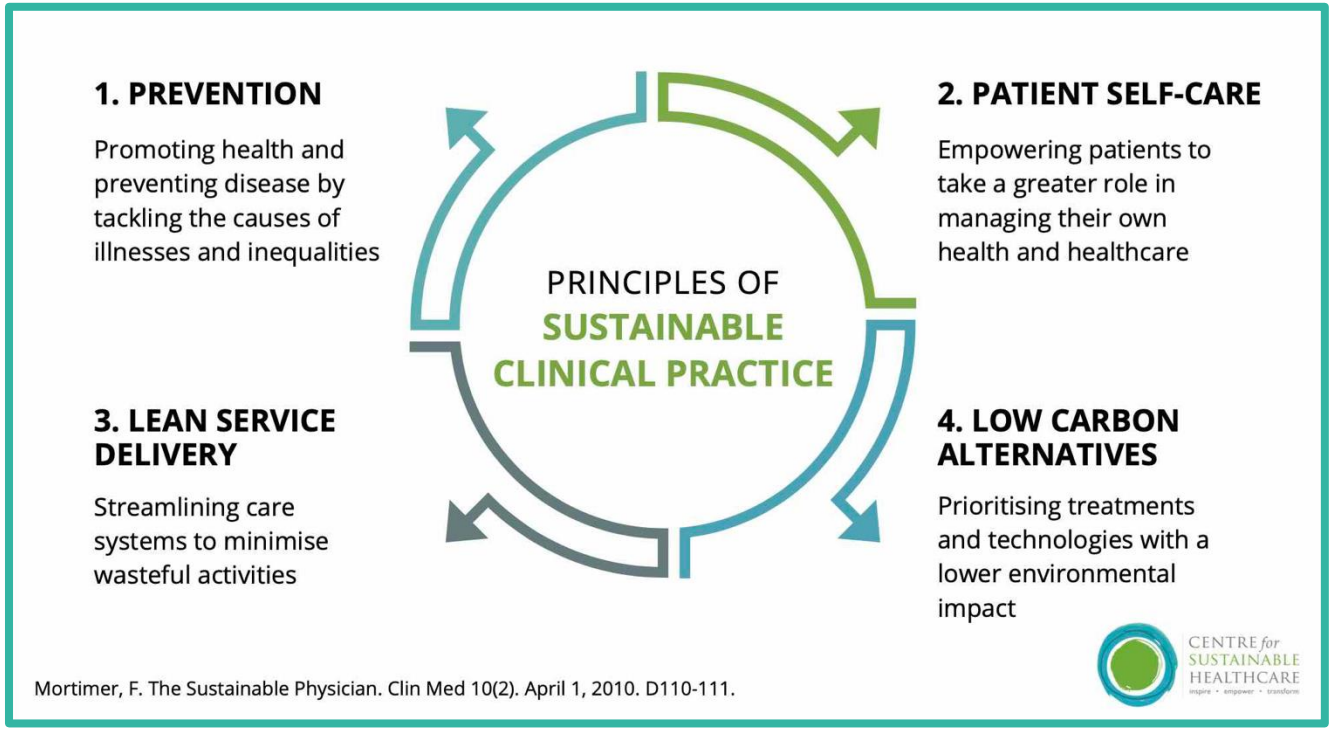
Sustainable By Design: Innovative Action Needed Across the Value Chain



Source: Healthcare without harm/Arup (2019); Healthcare without harm/World Bank (2017); UK National Health Service (2020); The Lancet Countdown (2020, 2018); Environmental research letters (2019); Health affairs (2020); BCG analysis

Lower carbon models of care are key to becoming Net Zero

NHS England. Areas of focus. 2022. Available here: https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/areas-of-focus/ (Accessed November 2023)



Centre for Sustainable Healthcare. What we do. 2023. Available here: https://sustainablehealthcare.org.uk/what-we-do (Accessed October 2023)

The Sustainable Healthcare Coalition

…is a partnership of healthcare companies and other health agencies drawn together to address some of the most pressing sustainability issues in global healthcare.

Our purpose is to facilitate the journey towards good health and wellbeing on a finite planet, through **open-minded collaboration** across **public and private healthcare**.

We **engage**, **connect** and **accelerate action**.

Our core group draws in participation from other health system players including trade bodies, state healthcare providers, public health institutions and international agencies.

Measuring Up for Impact

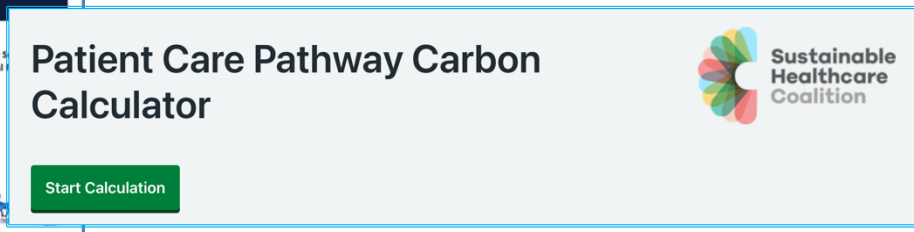
- World's first guidance on how to measure the **carbon footprint of pharmaceuticals and medical devices** and the environmental impact of **whole care pathways** and **clinical trials** using an activity analysis;
- Understand the current footprint of services and how **innovation can transform healthcare systems** through **case studies** that visualise care and **demonstrate impact**;
- Freely available **method & guidance systems** and an **online calculators** and emission factors.

Sustainable Care Pathways

Sustainable Clinical Trials

CARE PATHWAYS MODULES

- GP consultation
- Patient travel
- Emergency Department visit
- Inpatient bed day
- Surgical procedure
- Self-management
- Diabetes Management



GP visit x6 + In patient stay x1 + Surgery x1 + Patient Travel to GP x3 + Patient travel to Hospital = Care pathway

Clinical Excellence: Sustainable by Design

Activity Based Method *to assess the whole patient pathway, identifying the greatest opportunities to reduce impact across the system through innovation and collaboration :*

Knowledge Hub

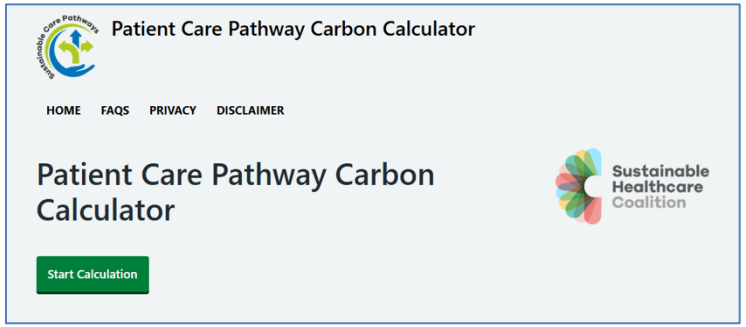
- One-stop portal with easy to use, step-by-step guides, carbon calculator tool, worked examples, case studies

https://shcoalition.org/sustainable-care-pathways-knowledge-hub/

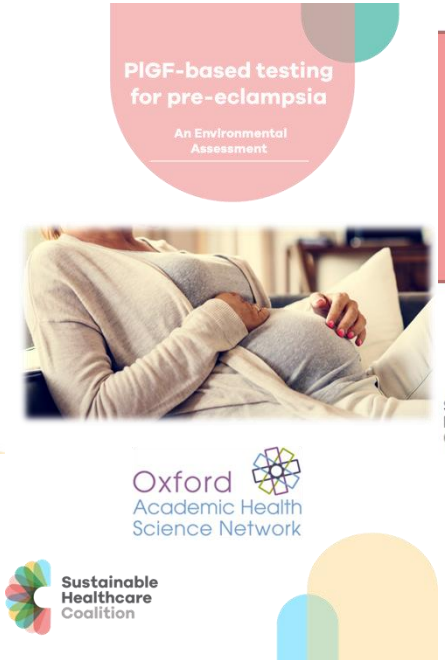
Care Pathway Carbon Calculator

- Easy to use, entry-level tool for simple assessments and education

https://carepathwaycarbon.org/



Learning from case studies: measuring impact and optimising care

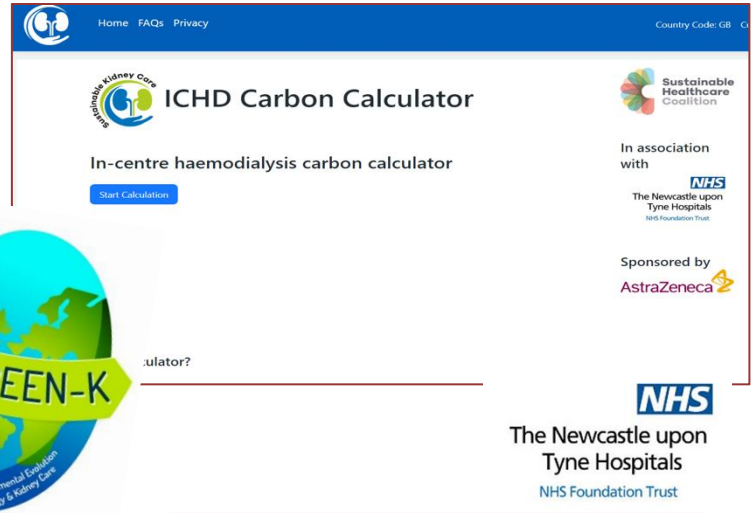


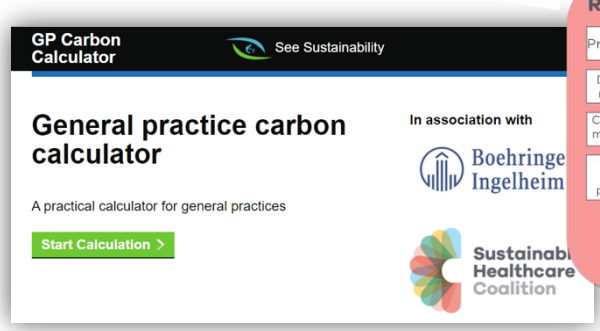
Sustainable Healthcare Coalition. Download Area. 2024. Available at: shcoalition.org. (Accessed October 2024)

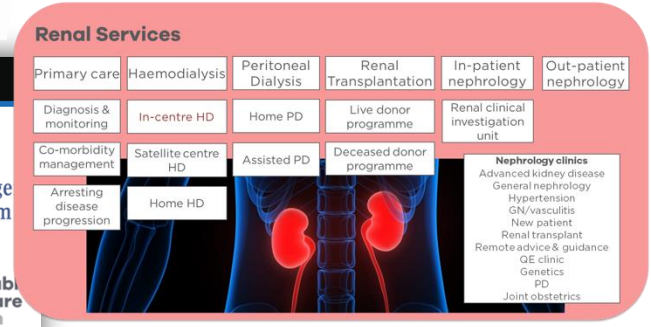
Clinicians Driving Innovation

Trusted partnerships join up the system and accelerate change by learning together through case studies & innovation:

- **Carbon footprint of renal haemodialysis services** at Newcastle UTH informing local and national carbon reduction plans with an **international carbon calculator** and **novel procurement asks;**
- **Shifting towards prevention and early intervention** such as testing for pre-eclampsia, vaccination for influenza, and modifying disease progression;
- **Measuring the impact of digital** approaches supporting selfcare;
- **General practice carbon calculator** to identify and manage non-clinical emission hotspots.



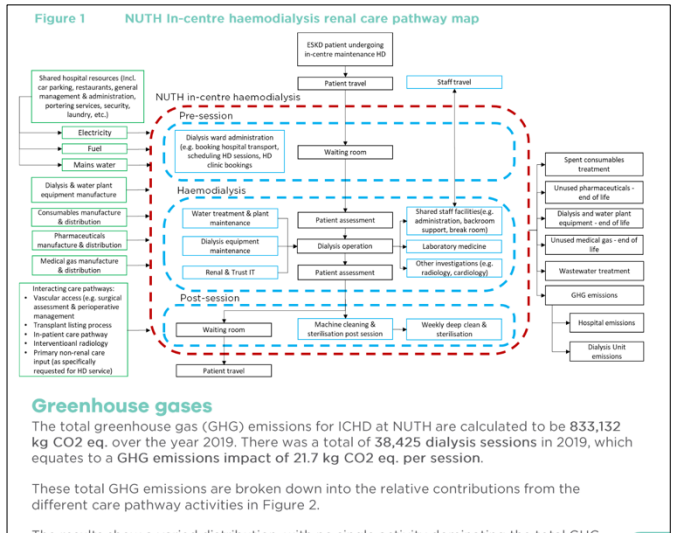


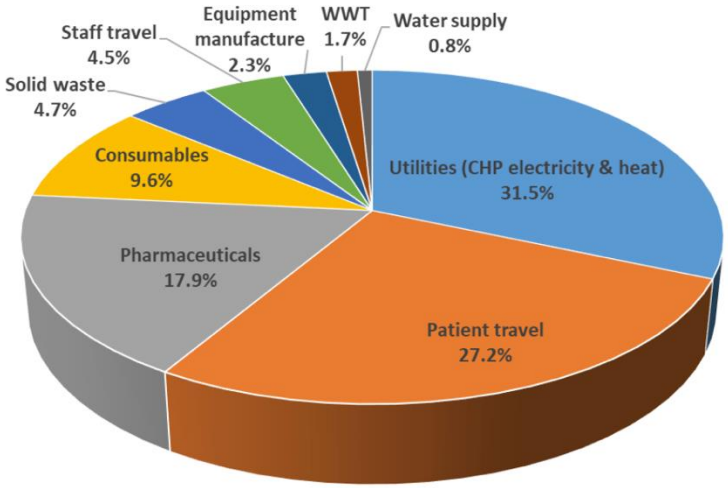


Overall impact of ICHD renal replacement therapy

- ***Pathway mapping*** of in-centre haemodialysis;
- 21.7 kg CO_2e per patient session at NUTH or 3.4 tonnes CO_2e per patient per year[1]

  Note: the average global citizen footprint is 4.3 tonnes CO_2e per year[2]
- ***Hotspots*** – Utilities, Travel, Pharmaceuticals
- ***Recommendations identified***:
  - Reduce energy use and increase efficiency
  - Work with supply chain on manufacture, packaging + distribution
  - Reduce transport emissions
  - Bulk delivery system

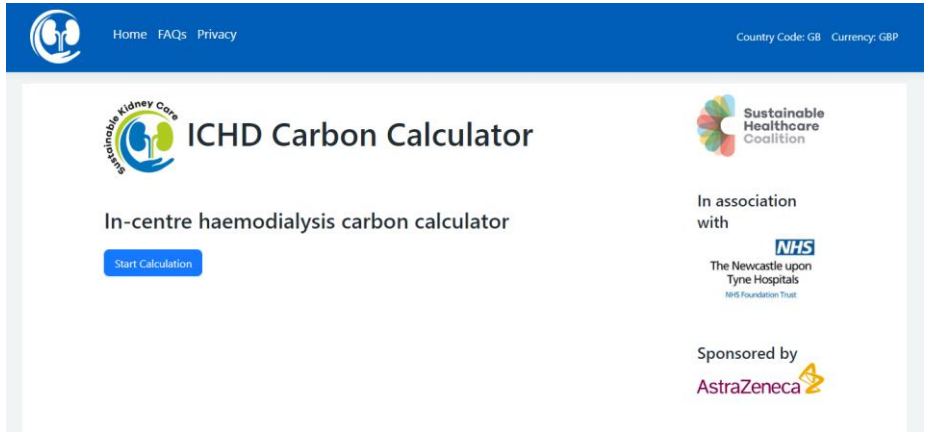




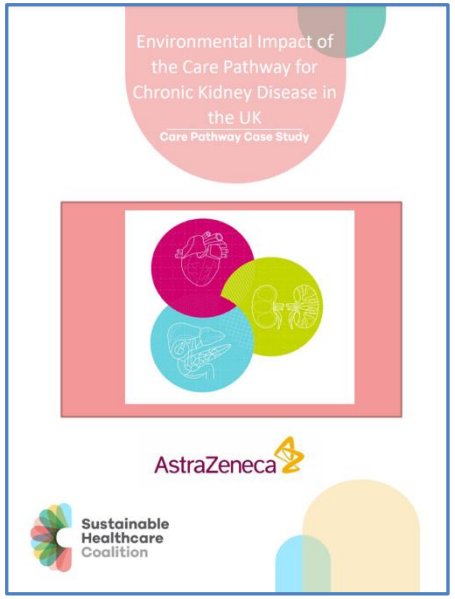
1. The Newcastle upon Tyne Hospitals NHS Foundation Trust. A Care Pathway Environmental Assessment of In-Centre Haemodialysis at Newcastle upon Tyne Hospitals NHS Foundation Trust. 2022. Available here: **https://shcoalition.org/in-centre-haemodialysis-at-newcastle-upon-tyne-hospital/** (Accessed October 2023) 2. The World Bank. CO2 emissions (metric tons per capita). 2020. Available here: https://data.worldbank.org/indicator/EN.ATM.CO2E.PC (Accessed November 2023) 3. Liyanage T, Ninomiya T, Jha V, Neal B, Patrice HM, Okpechi I, et al. Worldwide access to treatment for end-stage kidney disease: a systematic review. Lancet (2015) 385:1975–82. 10.1016/S0140-6736(14)61601-9

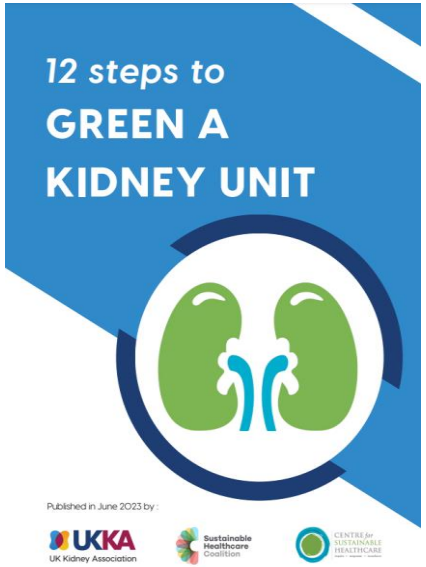
Applying Insight for Collaborative Action

Providing insight for sustainable kidney care:



https://ichdcarbon.org/





https://shcoalition.org/environmental-impact-of-the-care-pathway-for-chronic-kidney-disease-in-the-uk/

https://networks.sustainablehealthcare.org.uk/resources/12-steps-green-kidney-unit

KitNewCare
Sustainable Care, Lasting Impact

UKKA
UK Kidney Association
Sustainable Kidney Care

GREEN-K
Global Environmental Evolution in Nephrology and Kidney Care

Clinicians Driving Innovation Through Procurement

Understanding pathway impacts and shaping products and services through procurement :

Target Unmet Need	Engage (global market for innovative products / services)	Procure Novel products / services
✓ State Goals ✓ Vet by procurement experts ✓ Incorporate expert feedback ✓ Create / 'Joint Statement of Demand' draft	• Stakeholder consultation (*kidney community, later industry*) → Incorporate feedback • Supplier / industry consultation → Incorporate feedback	• Finalize strategy & update JSD **with endorsing societies** • Distribute initial generic JSD to stakeholders • Distribute JSD to supply chain • Initiate development of <u>product-specific JSDs</u>

ISN INTERNATIONAL SOCIETY OF NEPHROLOGY

INNOVATIVE SOLUTION REQUIRED!

- **haemodialysis acid concentrates**
- **reverse osmosis systems**
- **dialysis-related consumables**
- **innovative dialysis systems**

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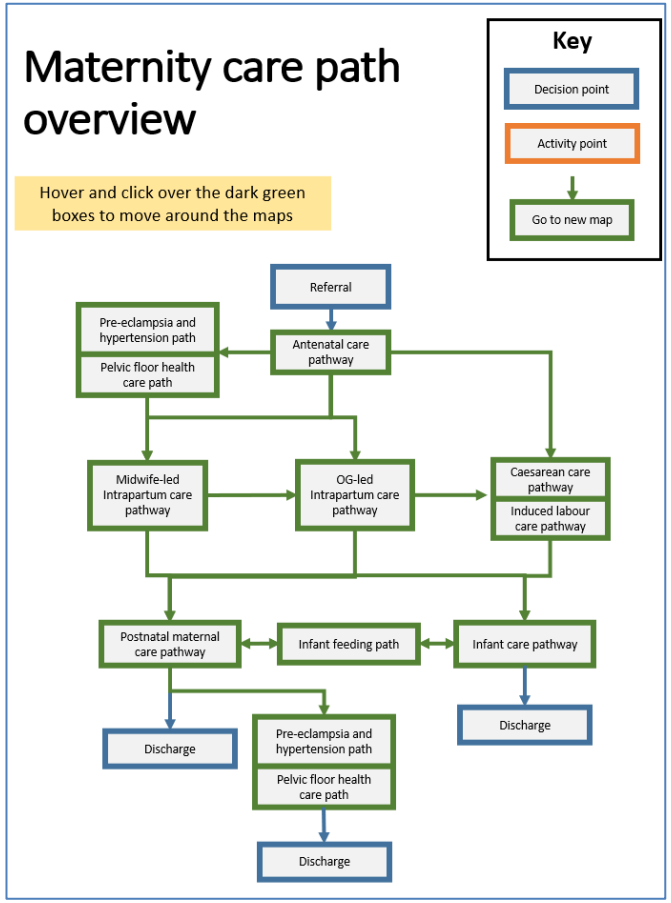
Source: Stigant CE, Barraclough KA, Harber M, Kanagasundaram NS, Malik C, Jha V, Vanholder RC. Our shared responsibility: the urgent necessity of global environmentally sustainable kidney care. Kidney International. 2023 Jul 1;104(1):12-5.; Whyles G, Van Meerveld H, Nauta J. Forward Commitment Procurement : The European Journal of Social Science Research. 2015 Jul 3;28(3):293-311.

Greener maternity care pathways



CENTRE for SUSTAINABLE HEALTHCARE
inspire • empower • transform

Royal College of Obstetricians & Gynaecologists

Royal College of Midwives

Sustainable Healthcare Coalition

SBRI HEALTHCARE

2-year project studying maternity care pathways

- Identifying areas of health inequality and carbon hotspots
- Supporting maternity teams in running quality improvement (QI) projects to address these issues through a ***Green Maternity Challenge***

GREEN MATERNITY CHALLENGE

- Bringing the maternity community together to discuss how the findings can influence future care
- Learning from ***lived experience of women*** in making sustainable choices
- Partnering with industry for innovation in products and services

Next Steps: an International Collaboration on Care Pathways

- **Work together** to **build the data base of activities** and its range **across geographies** and emission factors that underpin assessment capability with the Sustainable Markets Initiative
- **Co-developing** understanding, adoption and share **learnings**
- **Community of Practice**

https://www.linkedin.com/groups/16369001/

Patient Care Pathway Resources

Knowledge hub on SHC website

https://shcoalition.org/sustainable-care-pathways-knowledge-hub/

Care Pathway Carbon Calculator

https://carepathwaycarbon.org/

Community of Practice

https://www.linkedin.com/groups/16369001/

Adapting a care pathway approach: creating a standardised assessment to estimate emissions from clinical trials

Vision

To create a sector framework:

- **Methodology** and **guidance** to assess and report on carbon footprint of clinical trials
- In support of reporting of footprint, an open-access **tool** with **activity-based data** to identify emission hotspots

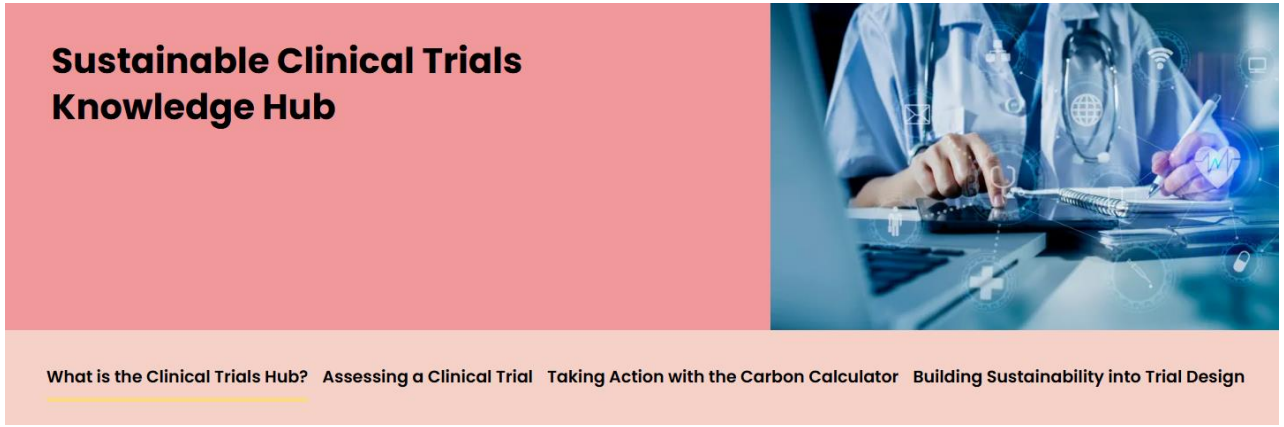
Key organisations involved

Milestones

- Methodology and guidance published
- Open-access tool launched
- Engagement with key stakeholders as part of process to build awareness, acceptance and deployment
- Expanded database and Knowledge Hub

Sustainable Clinical Trials

Low-carbon clinical trials resources and supply chain collaboration



Knowledge hub:

https://shcoalition.org/clinical-trials/

Clinical trial carbon calculator:

https://clinicaltrialcarbon.org/

Sustainable Clinical Trials

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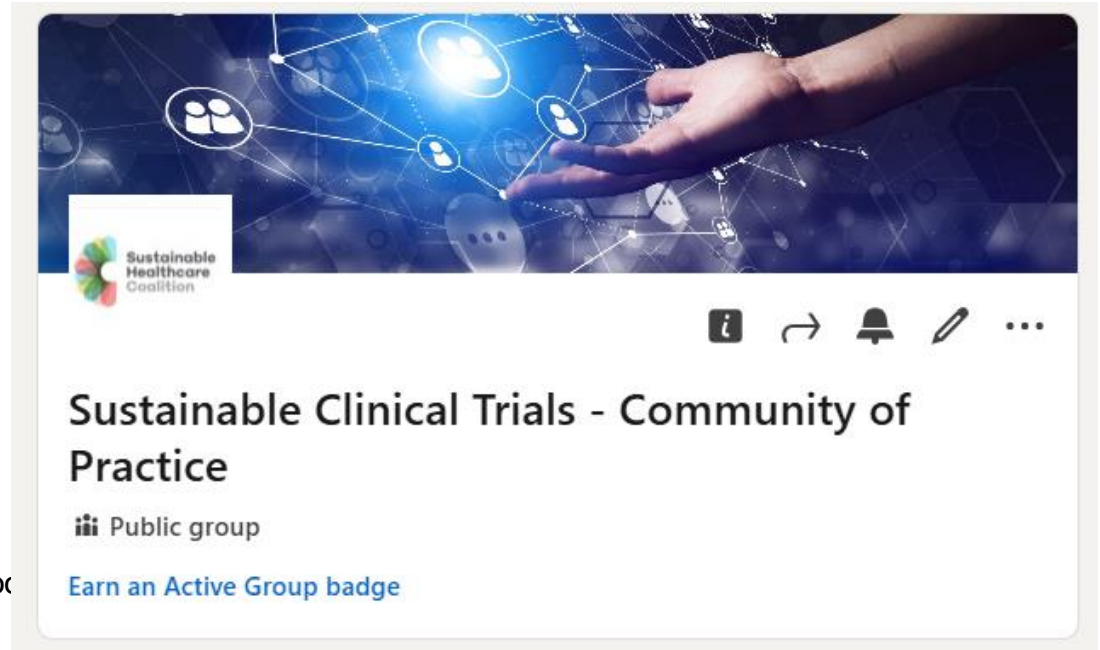
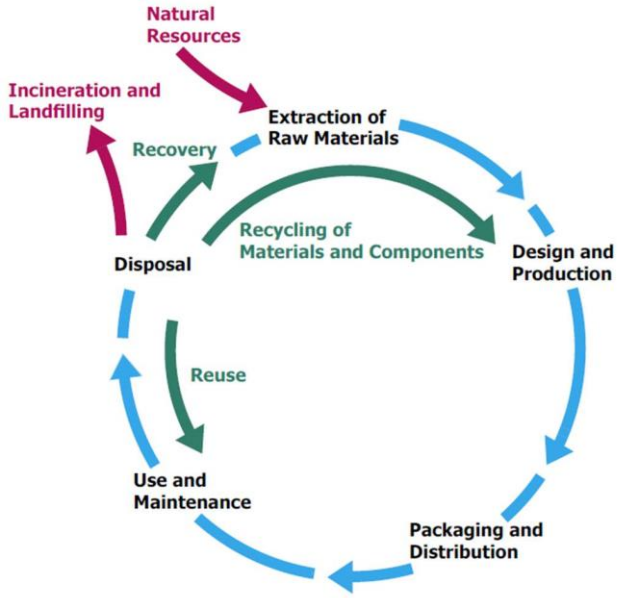
Join the Community of Practice



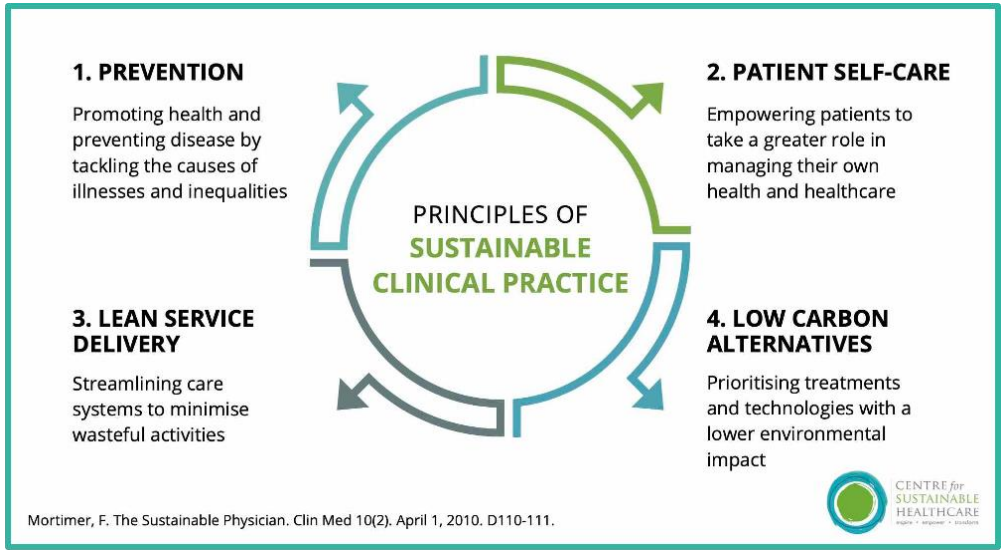
Why Care Pathways?

Looking through product and health system lenses



- **Life cycle assessment (LCA)** studies establish the carbon footprint of **products**, accounting for all material 'cradle to grave' contributions
  - LCA studies focusing on **direct** impacts (manufacture, supply and end-of-life) alone may provide a partial picture of global effects, resulting in incomplete comparisons and poor decisions

- **A Care Pathway approach** includes all of the consequences of **delivering a patient outcome**, including the **indirect** impacts of interventions
  - Products with higher direct impacts may avoid indirect care pathway effects and offer net benefits in the impacts of healthcare delivery in the round



Assessing System Impact: taking a care pathway perspective

Although a useful metric, intervention-level LCAs alone are insufficient to evaluate the full environmental impact of an intervention when used in practice.

To do so, one needs to consider the entire care pathway, looking at:

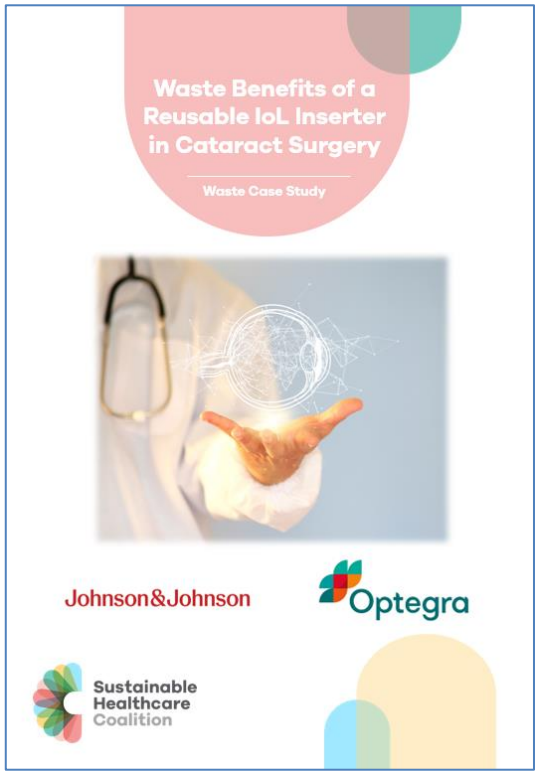
- how the intervention is given in which setting of care
- how this fits into the pathway from diagnosis to long-term management
- inefficiencies in the care pathways within which an intervention is delivered
- the way an intervention is given, accounting for misdiagnosis, over- or inappropriate prescribing
- in the case of medicines, the impact of low adherence.

Taking a care pathway approach to measurement is particularly important for chronic conditions, where health interventions may help prevent progression to later stages of disease, which are associated with higher morbidity, higher resource use and a larger environmental impact.

Assessing Impact – The Role of Novel Devices

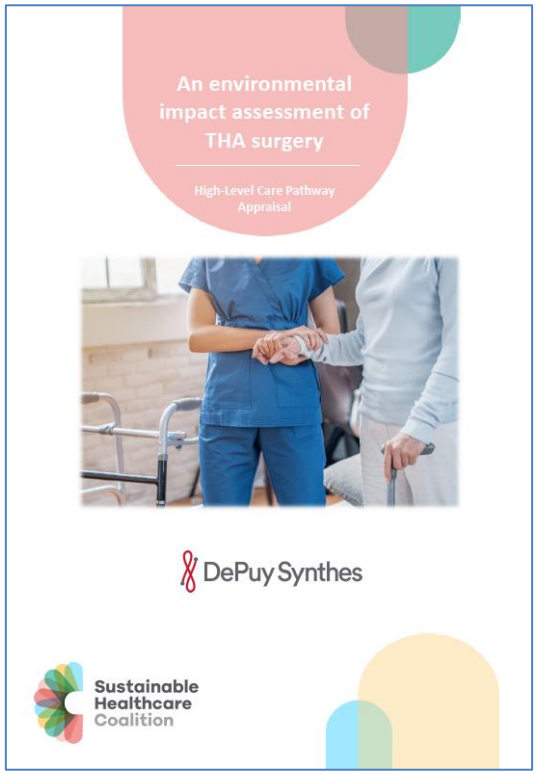
***Cataract surgeries**, the most frequently conducted surgical procedure globally, are often performed with a single-use intraocular lens (IoL) inserter:*

- When a **single-use IoL inserter** is used, the whole device is disposed of and goes to waste treatment.
- With a **reusable inserter**, only the IoL cartridge is waste. The inserter is sent for sterilization and reuse up to 500 times.
- In a pilot study at Optegra, the switch to reusable meant **less frequent deliveries, less storage space occupied and less waste.**
- Scaled up, the technology could save over **9,300kg of waste per year in England**



https://shcoalition.org/waste-benefits-of-a-reusable-iol-inserter-in-cataract-surgery/

***Hip replacement** (Total Hip Arthroplasty, THA) is a high-volume procedure with ~117k being performed a year in the NHS:*



https://shcoalition.org/an-environmental-impact-assessment-of-total-hip-arthroplasty-tha-surgery/

- Revision THA surgery has a carbon footprint about three times larger than a primary THA procedure;
- The **carbon footprint** of a collared hip implant may be bigger than an equivalent collarless one, but a **lower frequency of revisions** means that it has a lower lifetime carbon footprint;
- Using 2024 National Joint Registry figures, **598t CO2e could be avoided** had all the cementless hip implants that year been collared.
- And ~700 patients will have **avoided a revision** THA over the decade following their surgery .

Balancing Total Hip Arthroplasty with Environmental Impact

Mapping the THA care pathway for carbon emission estimation of both primary and revision procedures

116,901

Primary THA surgeries performed in the UK in 2024, and rising

~3x

Higher footprint for revision THA (810–820 kg CO_2e) vs primary (300 kg CO_2e)

42%

Lower 10-year revision rate: collared vs collarless cementless stem

598 tCO_2e

Potential annual saving from lower-revision implants, equal to ~142 UK households' yearly footprint

Mindset leads to changes in decision-making

Where the carbon sits

Inpatient bed days are the single biggest contributor to footprint for both primary and revision THA, driven by length of stay, not the implant itself.

Implant choice as a carbon lever

The collared stem's lower revision rate could avoid an estimated 734 revision procedures over 10 years, each carrying almost 3x the footprint of a primary operation.

Pathway view over product view

Mapping the full journey, from GP referral to 1-year follow-up, shows how clinical outcomes as well as materials drive footprint and reveals hotspots a product-only view would miss.

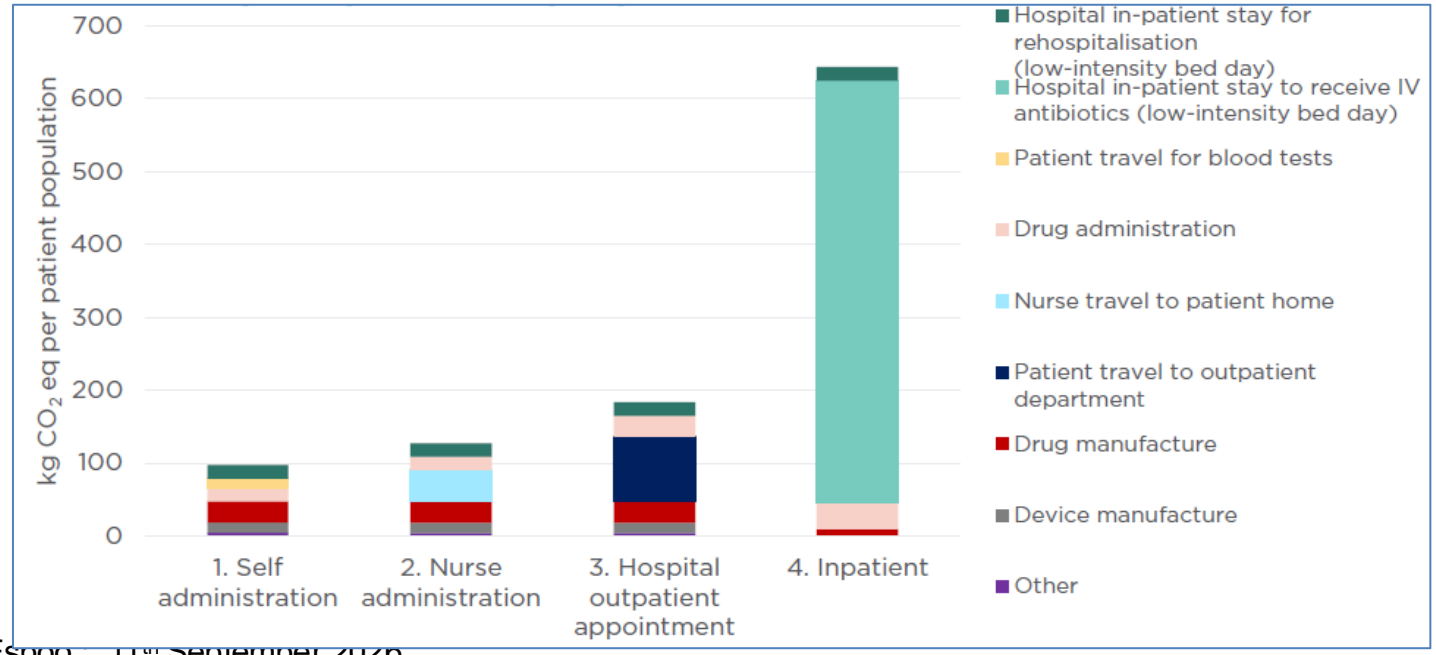
Scale: this is a screening assessment based on secondary data. A comprehensive appraisal, using primary implant and site-specific resource data, is a clear opportunity for a future industry– healthcare collaborations.

Moving care to the patient – A Case Study

Intravenous Parenteral Antimicrobial Therapy is usually delivered in hospital settings. Shifting delivery models into the community can reduce water use and waste and save up to 85% of emissions:

https://shcoalition.org/environmental-impact-of-outpatient-parenteral-antimicrobial-therapy/

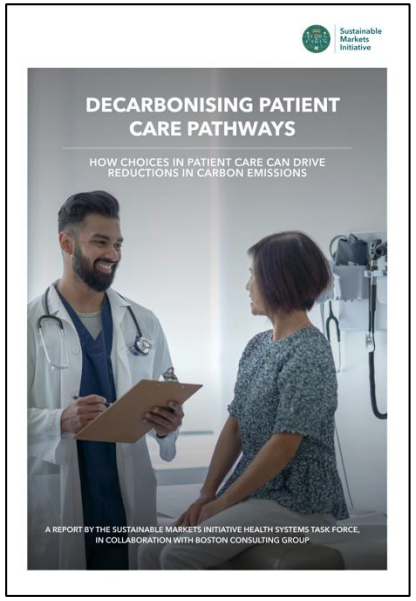
Scenario	Results per patient	GHG kg CO_2 eq	Water m^3	Waste kg
1	Self administration	97.2	241	5.5
2	Nurse assisted administration	127	241	5.4
3	Hospital outpatient appointment administration	184	292	7.5
4	Inpatient administration	643	1,085	59.2



JAC-Antimicrobial Resistance, Volume 7, Issue 2, April 2025, dlaf030,

Achieving Net Zero: All have a Role to Play in Decarbonisation

Decarbonisation needs to become an integral part of how all stakeholders assess options to deliver high quality, patient centric care. Health systems are complex, and all stakeholders need to be involved in designing and adapting solutions – with each having a role to play.



Clinicians and healthcare professionals:
- Implement guidelines focused on prevention & early intervention
- Optimise investigation, prescribing & treatment
- Use lower-emission treatments when available & safe
- Implement recommendations to decarbonise their own care settings
- Support increased sustainability education for healthcare professionals

Government and policymakers:
- Pass policy that enables a green transition in health systems
- Fund emissions reduction initiatives in healthcare settings
- Enable the use of digital solutions to improve health and reduce emissions
- Support healthy, low-carbon lifestyles

Health authorities & payers:
- Align coverage to reduce emissions
- Promote healthy lifestyles

Patients and patient groups:
- Share information on how patient care options impact the climate
- Empower patients to explore and align on green care options with healthcare professionals

Providers & facility managers:
- Identify emissions hotspots & set targets
- Increase energy efficiency & switch to greener forms of energy
- Decarbonise transport by electrifying fleets
- Reduce emissions from hospital waste
- Educate staff on emissions reductions
- Design carbon neutral facilities

Regulatory bodies:
- Adopt green criteria in new treatment approval (e.g., green labelling), including CO_2e as a key metric

Pharma, biopharma, med-tech:
- Publish product-level emissions date
- Decarbonise own operation & supply chain
- Redesign products to reduce their cabon footprint
- Invest in prevention & early detection

Sustainable Healthcare Coalition

Source: Health Care Without Harm, WHO, Academic Literature , BCG Analysis from SMI Publication, Decarbonising Patient Care Pathways: How Choices In Patient Care Can Drive Reduction in Carbon Emissions (https: //a.storyblok.com/f/109506/x/88fe7ea368/smi-hstf-pcp-whitepaper.pdf)

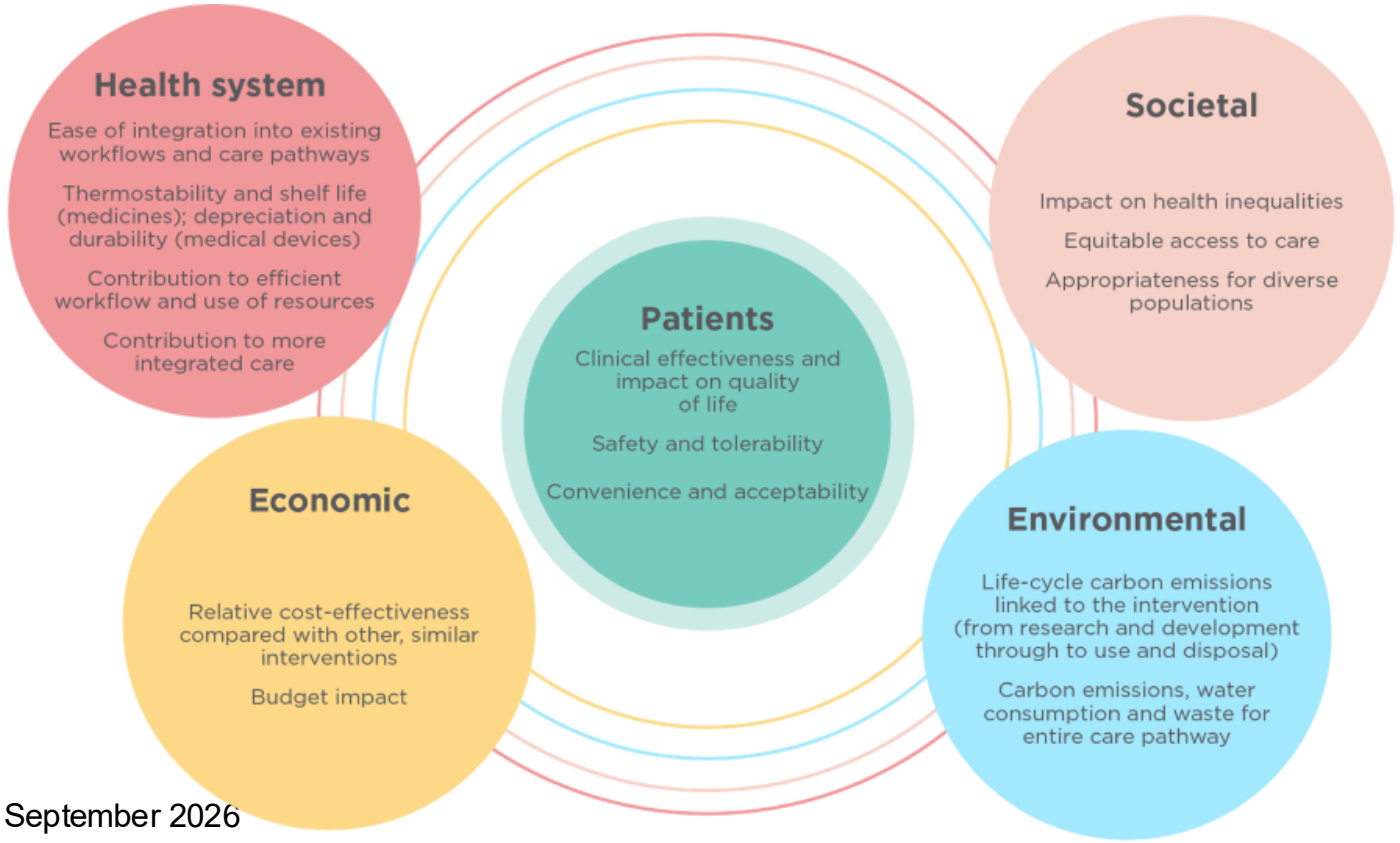
Lessons from Evidence-Based Practice: What Will it Take?

1

CHANGE THE RULES

Developing a Comprehensive Vision of Value

The case for why environmental impact should be a component of value-based care so that quality is based on environmental impact as well as clinical outcomes & cost:



Invitation to co-create solutions: guiding principles for all

Work together to create a methodologically sound, transparent approach which rewards innovation to lower environmental impact whilst prioritising health outcomes and access:

- **Patient health outcomes come first**
  Advancing environmental goals should never come at the expense of improving patient outcomes.

- **Take a care pathway approach to measurement**
  Assessing the environmental impact of a given health intervention must take a comprehensive approach, looking at the context within which health interventions are used and their impact over time.

- **Protect innovation and patient access**
  We need to safeguard against unintended consequences where added requirements by HTA agencies could lead to delays in patient access.

- **Take a multi-stakeholder approach**
  HTA agencies and academia should work closely with industry, payer, patient and carer organisations, and professional societies to build consistent and feasible methodologies, and evaluate their application in practice.

- **Ensure open communication and transparency**
  Getting this right will take time and must be guided by collaboration and dialogue between all stakeholders.

- **Build environmental literacy**
  We must all work together with patient organisations and professional societies to facilitate informed care choices for patients, and ensure patient perspectives are appropriately reflected in discussions about evolving HTA and other decision-making frameworks that will affect their care.

Value-based procurement

NHS Supply Chain

ATACH
Alliance for Transformative Action on Climate and Health
WHO hosted network

GIG CYMRU NHS WALES
PCGIG Caffael Tîm Cynaliadwyedd
NWSSP Procurement Sustainability Team

Sustainable Procurement Resources

Sustainable Risk Assessment Support

Case Studies

Well-being of Future Generations (Wales) Act 2015

MedTech Europe
from diagnosis to cure

Value-Based Procurement Conference

Procure 4Health

Applying Insights to Accelerate Action

Trusted partnerships join up the system and accelerate change through innovation, and we've learnt the power of:

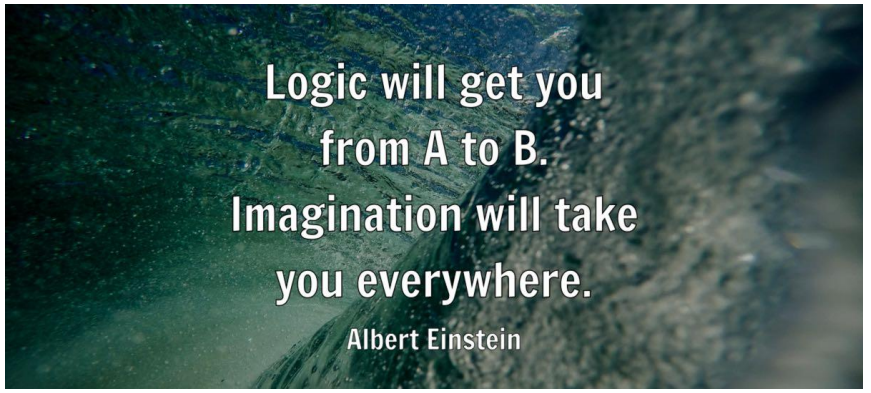
- Amplifying our approach by collaborating with others and championing the power of open-minded conversations with common purpose;
- Seeking new perspectives and possibilities from clinicians and patients, such as novel procurement approaches;
- Reimagining system rules so that quality is based on environmental impact as well as clinical outcomes and cost;
- Measuring impact and demonstrating that change is possible via case studies through bringing a new lens to old problems;
- Acting now with an experimental mindset and learning by doing.

We welcome opportunities to collaborate, understand barriers to change & "test to learn" for new approaches & gain an International perspective.

GREEN-K
Global Environmental Evolution in Nephrology & Kidney Care

Sustainable Markets Initiative

Beyond the Evidence: Leadership, Values, Choices and Decisions



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Thank you

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Contact/Questions?

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