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From Climate Risk to Low-Carbon Care

A joined-up approach for the NHS

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Specific research interest

Health inequalities within
multiple long-term conditions
(MLTCs).



Climate and health evidence

Part of the Big Data in Health Group, compiling a body of work on the impacts of extreme weather events on increased risk of hospitalisation and mortality.



Identifying who is most at risk

Phenotyping these risks to identify who is most at risk within the MLTC population based on clinical conditions, social demographics and social care needs.



Towards preventative action

Moving towards preventative actions to mitigate climate-related health risks for people with MLTCs.



Primary care readiness

Exploring how ready the primary care service is to implement risk stratification and support targeted, proactive care.

A changing climate. A healthier, lower-carbon future.

From climate risk to proactive care for people with multiple long-term conditions (MLTCs)



Climate change

Rising temperatures,
more frequent and severe
extreme weather events



Extreme weather events

Heatwaves, floods,
storms, wildfires



Increased hospitalisation and NHS use

Higher demand for urgent
and acute care, particularly
among people with MLTCs



Higher NHS carbon footprint

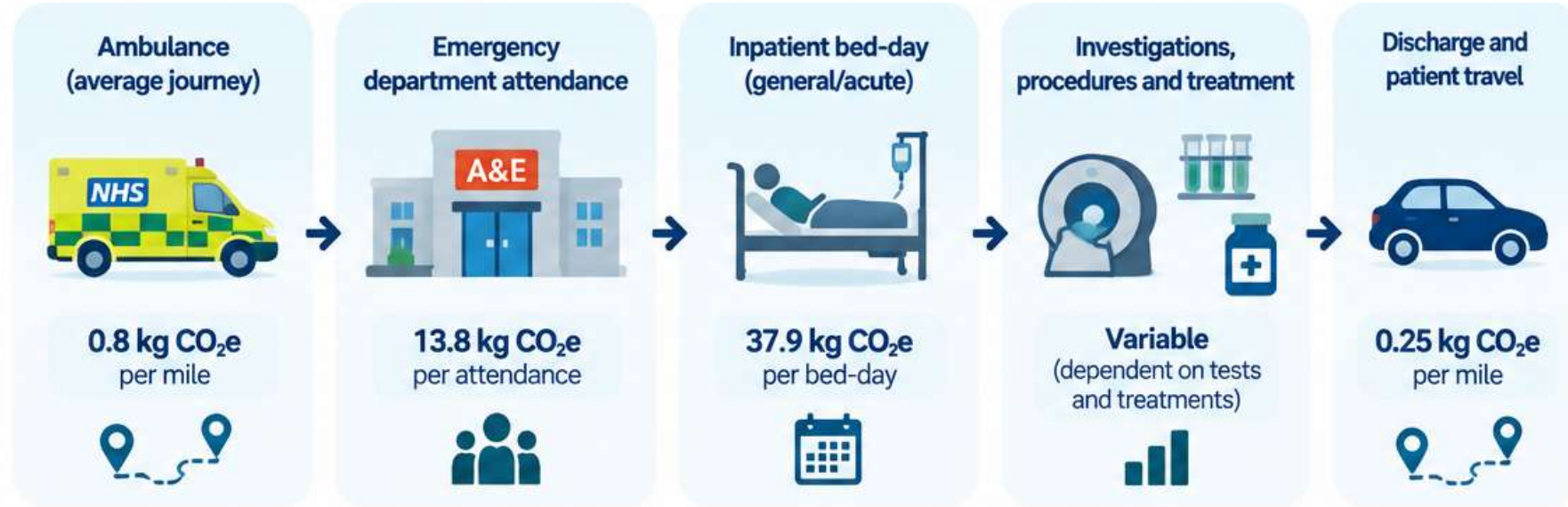
More care, more resources,
higher emissions





An unplanned hospital admission has a significant carbon footprint

Each stage of care contributes to emissions – and longer, more complex admissions generate more carbon.



References:

1. Eckelman MJ et al. Health Affairs 2020;39(12):2071–2078. Estimated greenhouse gas emissions for admitted patient care in England, 2019/20 (updated in subsequent analyses). Figures: ED attendance 13.8 kg CO₂e; general/acute inpatient bed 37.9 kg CO₂e per day; critical care/HDU/ICU bed 89.5 kg CO₂e per day; ambulance 0.8 kg CO₂e per mile; patient travel 0.25 kg CO₂e per mile. <https://doi.org/10.1377/hlthaff.2020.01279>

Multiple long-term conditions: a growing and vulnerable population

Understanding who is at risk is essential for targeted, equitable and climate-resilient care.

MLTCs are common and increasing



14.8%

of people in England have two or more long-term conditions.¹



67.8%

of people aged 65+ are projected to have MLTCs by 2035 (up from 54.0% in 2015).²

References:

1. Cox B et al. BMJ Open 2022;12:e061349. (14.8% of people in England had ≥ 2 long-term conditions in 2020).
2. Jani BD et al. Age Ageing 2019;48:776–782. (Projected prevalence of multimorbidity in people aged 65+).
3. Public Health England. Health matters: multiple long-term conditions. 2021. (People in most deprived areas up to four times more likely to have MLTCs).
4. Barnett K et al. Lancet Public Health 2012;7:e32–e41. (Onset 10–15 years earlier in more deprived areas).
5. Rocque RJ et al. Lancet Planetary Health 2021;5:e66–e77. (People with chronic conditions are more vulnerable to climate-related hazards).
6. Simpson G, Dambha-Miller H, Smith L. Temperature extremes, climate change and multimorbidity: A rapid scoping review. J Climate Change Health. 2025;24:100452.



Extreme heat and cold increase health risks for older adults with MLTCs

A population-based study of 3.3 million people aged ≥ 65 years in England (2001–2020).



3.3 million

adults aged ≥ 65 years
with multiple long-term conditions (MLTCs)



2001 – 2020



Linked primary care,
hospital and mortality data



England
(9 regions)

Reference:

Isaac T, Jat A, Simpson G, Smith L, Hasan M, Sheffield J, Dambha-Miller H. Weather extremes and outcomes for older adults with multimorbidity in England: a retrospective population-based time-series study, 2001–2020. (In submission).

Colder
winters.
Greater
pressures.

People with
multiple conditions
are more vulnerable.

Winter pressures and MLTCs: why condition combinations matter

A population-based cohort study of ~48 million people in England (2021–22).



~48 million
people in England
(2021–22)



People with multiple
long-term conditions (MLTCs)
had substantially higher
winter admission risk.



Certain combinations
of conditions carried
greater risk than
condition count alone.



Winter pressures were
not evenly distributed
across the population.

(e.g.)

Reference:

Islam N, Shabnam S, Khan N, et al. Combinations of multiple long-term conditions and risk of hospital admission or death during winter 2021–22 in England: population-based cohort study. *BMJ Medicine*. 2024;3:e001016.

What could we do?

From weather warning to anticipatory care

Using data and digital tools to support people with long-term conditions



References:

1. Michels LV, Smith L, Ghannam S, Gadd C, Dambha-Miller H. Application of Artificial Intelligence in Analysing Meteorological Data for Health Research: A Rapid Review. *Preprints*. 2026;202603.0641.
2. Smith L, Pinn C, Yousef Y, Dambha-Miller H. Digital interventions to support people living with long-term conditions during extreme weather events: A rapid review. In submission, 2026.

Is the system ready?

Insights from people, practice and the current tool landscape



References:

1. Simpson G, Smith L, Tiwari R, Little P, Santer M, Lloyd J, et al. Impact of climate change and associated extreme weather events on primary care: A multi-perspective qualitative study in multimorbidity. In submission, 2026.
2. Michels LV, Smith H, Smith L, Dambha-Miller H. Environmental scanning of climate adaptation tools in healthcare. In submission, 2026.

What do we know – and what do we need to know next?

Building towards a healthier, more resilient and lower-carbon future

WHAT OUR GROUP HAS ESTABLISHED



Extreme weather affects health

Heat and cold are associated with increased hospitalisation and mortality in people with MLTCs.



Risk is not equal

Vulnerability varies by clinical and sociodemographic characteristics.



We can move towards identifying who is at risk

Linked health, social and environmental data offer the potential for more targeted approaches.



There are possible ways to intervene

Digital and anticipatory approaches exist — but the evidence and current system are not yet mature.

An important missing piece

THE CARBON QUESTION



Can protecting people from climate-related harm also deliver a measurable reduction in NHS carbon emissions?

WHAT WE DON'T YET KNOW



What is the carbon consequence of climate-related healthcare demand?

How much additional carbon is associated with climate-related illness and unplanned care?



How much carbon is associated with an unplanned admission?

And how does this vary by pathway of care, condition and length of stay?



Could anticipatory intervention avoid healthcare use and emissions?

What is the potential impact of targeted support on both health outcomes and carbon?



What is the carbon cost of the intervention itself?

Including digital tools, monitoring, workforce time and infrastructure.



Where is the greatest opportunity for a genuine net carbon benefit?

And how do we ensure interventions are equitable, effective and acceptable?



An opportunity for collaboration

Can we bring climate-health, MLTC and carbon expertise together to quantify and test this pathway?



Share expertise



Develop joint research



Build evidence for change

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Get in touch

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