Climate Change and the Role of the Health Sector

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Health care resource consumption

- Hospitals run 24/7, high tech diagnostic and therapeutic equipment, high energy intensity buildings
- Health care has unique infection risks/prevention requirements
- Regulatory complexity and business models driving low-value consumption of resources
- Culture of excess, and disposability normalized
- Social mission to individual patients, but what about public health?

A da Vinci surgical device being used to remove a patient's prostate gland. Aberration Films Ltd./Science Source

Conducting a waste audit at Magee Women's Hospital of UPMC

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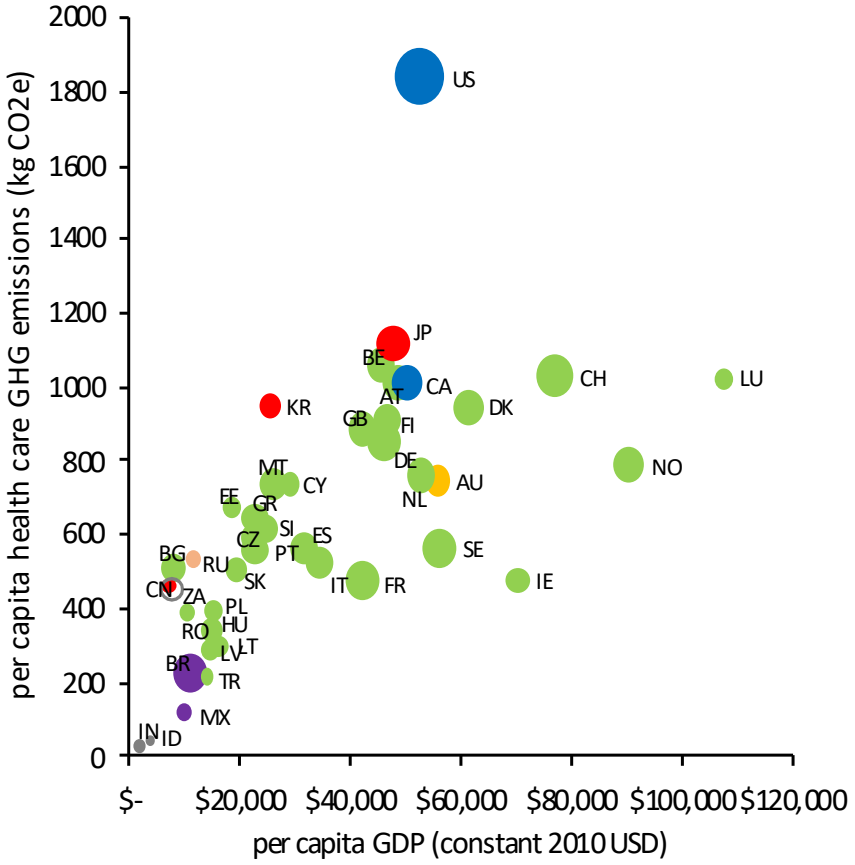
Globally, health care emits 4.9% of total global GHG emissions in 2018 (and is rising)

- Health care is 10% of global economy
- Globally, health care emits 4.9%
- US health care has highest per-capita GHG emissions of any nation
- Ireland health care about 900 kg CO2e per capita



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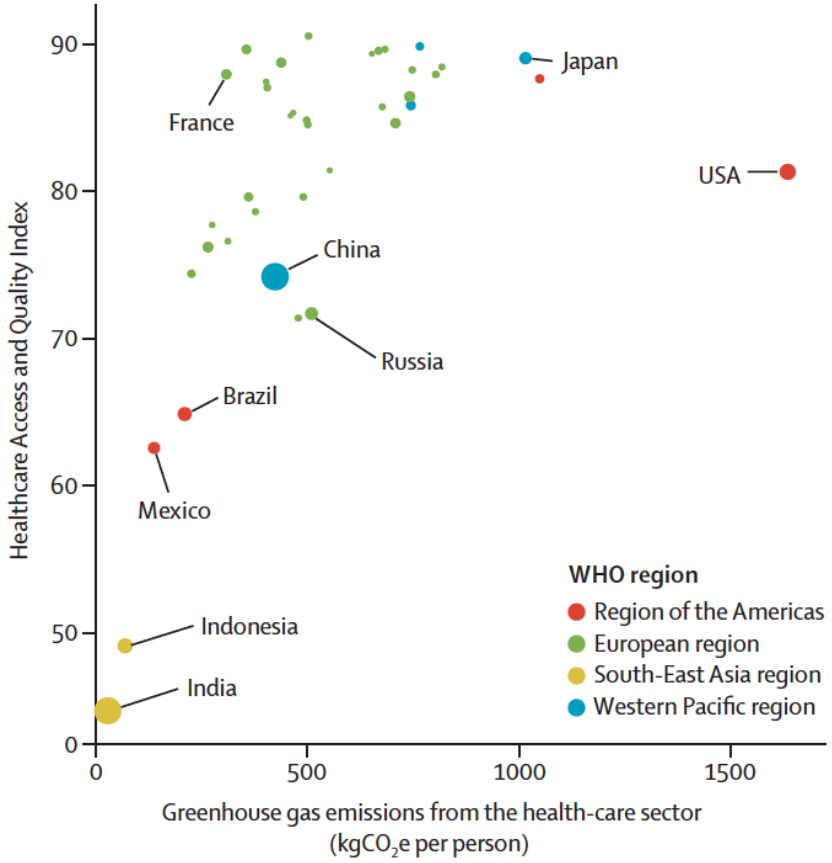
Watts, Lancet Countdown 2019
Eckelman, Dubrow, Sherman, et al, Health Affairs 2020

Health care access and quality and health care GHG emissions

- Ireland health care about 900 kg CO2e per capita
- After about 450 kg CO2e per capita health care emissions, no improvements in access and quality
- 1/4 of health care services are deemed inappropriate, low-value



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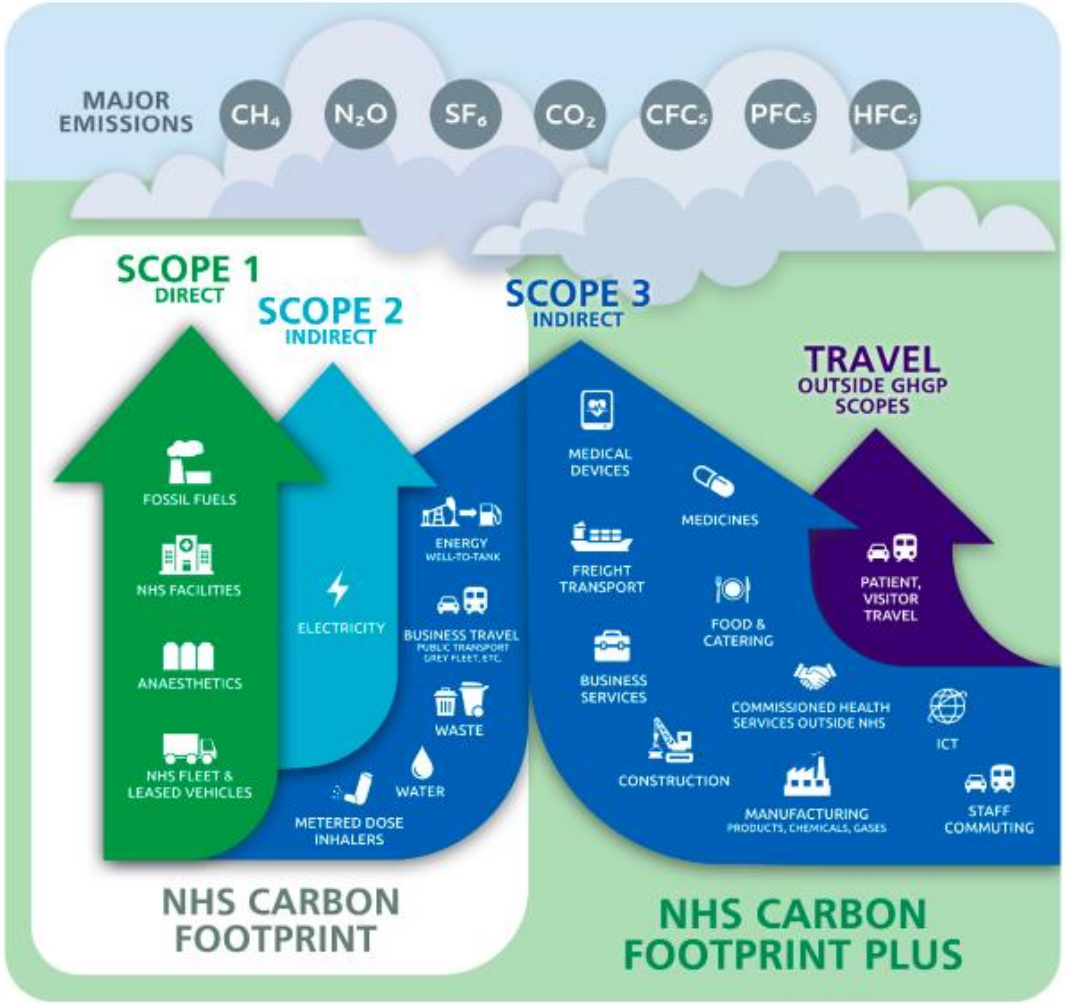
Watts, et al., Lancet Countdown 2019
Eckelman, et al., Health Affairs 2020
Berwick and Hackbarth, JAMA 2012

Health Care's Carbon Footprint



UK NHS Net Zero report, 2020

- Greenhouse Gas Inventory Protocol
- Includes direct (on-site) and indirect emissions from supply chains and travel

Health Care GHG Emissions Contributions

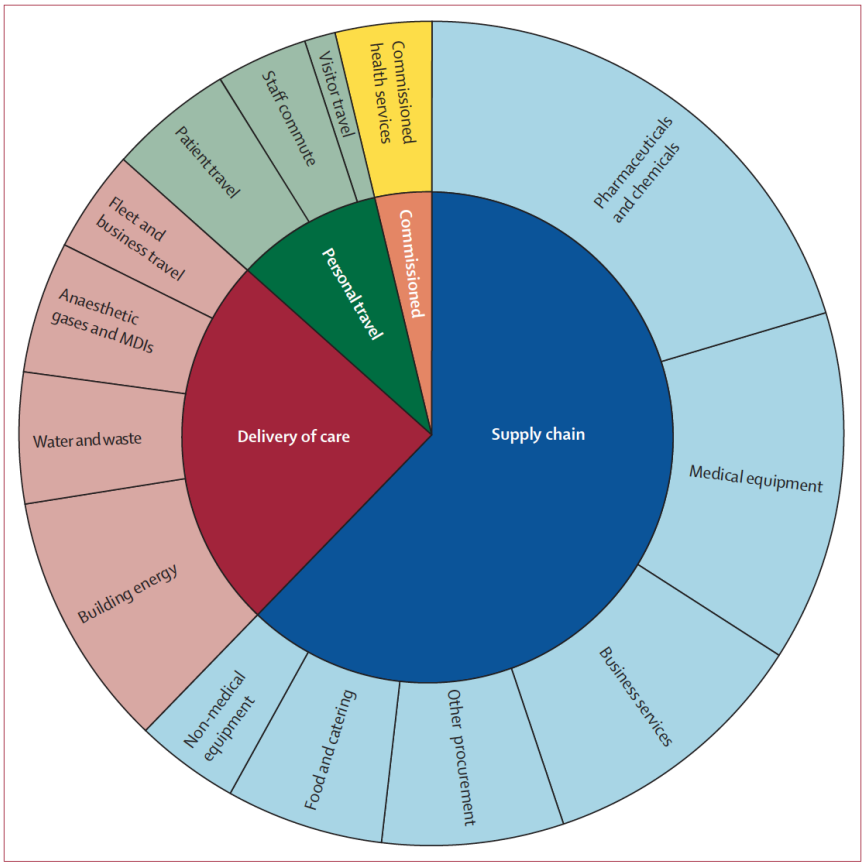


Figure 4: **Contribution of different sectors to the greenhouse gas emissions of the NHS England, 2019**
Data available in appendix 1 (p 39). MDI=metered dose inhaler. NHS=National Health Service.

- 2/3^{rds} from supply chain
  - Pharmaceuticals and chemicals
  - Medical devices and supplies
  - Food
- Clinicians, health care administrators, and regulators control consumption (demand and appropriate use)
- Manufacturers and regulators control embodied emissions, what goes to marketplace

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Tennison *et al.*, *LPH* 2021

Relative GHG and non-GHG emissions by National Health Expenditures

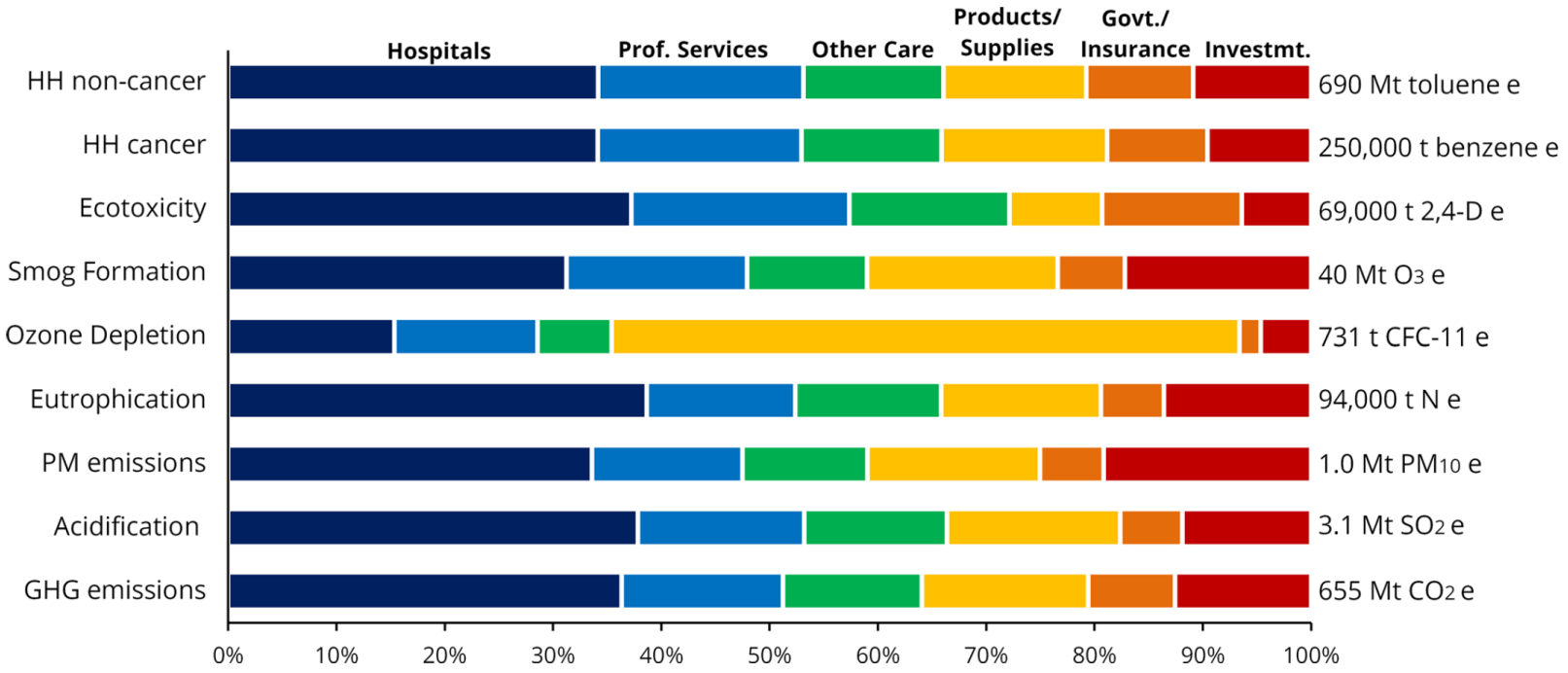

Fig 2. Environmental/health impacts of U.S. health care activities. Depicted by TRACI impact category (left vertical axis) and disaggregated by expenditure categories (colors, horizontal axis). Sector totals listed for each impact category (right vertical axis). Mt = Million metric tons, Prof. = Professional, Govt. = Government, Invstmt. = Investment.

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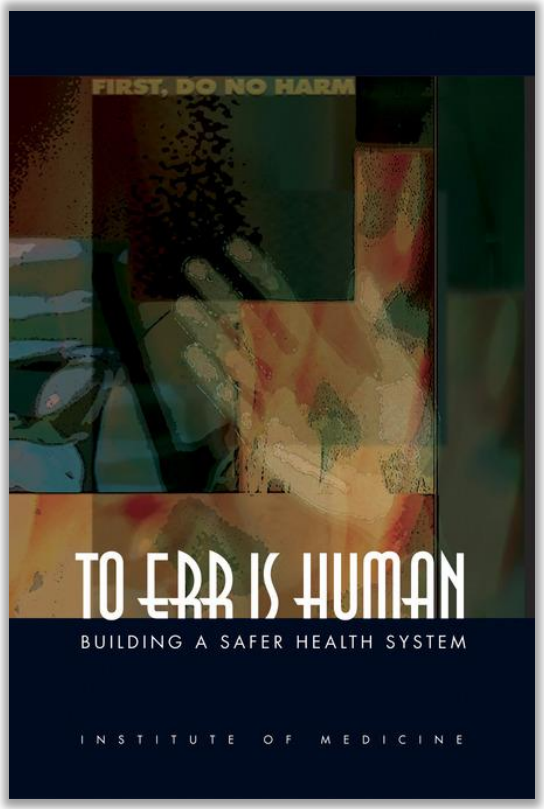
Eckelman, Sherman, *PLoS ONE* 2016

US Health care pollution disease burden

- public health damages from US health sector pollution, 388,000 DALYs (especially from particulate matter)
- Similar in magnitude as the 44,000-98,000 deaths due to medical errors, IOM 2000
- **Pollution prevention the new patient safety movement**



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Eckelman *et al*., *Health Affairs* 39, No. 12 2020
Eckelman, Sherman, *Am. J. Public Health* 2017
Eckelman, Sherman, *PLoS ONE* 2016

What is best practice for both patients and public health?

Net Zero Health Care: the Planetary Healthcare Framework

- Reducing emissions embodied within health care services
- Matching supply and demand
- Reducing demand for health care

$$\text{value} = \frac{\text{Outcomes for Patients \& Populations}}{\text{Environmental + Social + Financial Costs}}$$

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MacNeill, et al., *LPH* 2021
Sherman, et al., *BMJ* 2021