

Sustainability, value and quality improvement

Dr. Frances Mortimer

Medical Director, Centre for Sustainable Healthcare, Oxford, UK

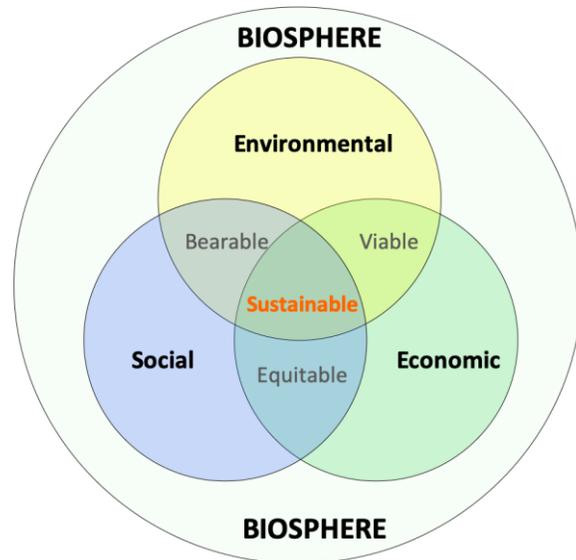
@FrancesMortimer

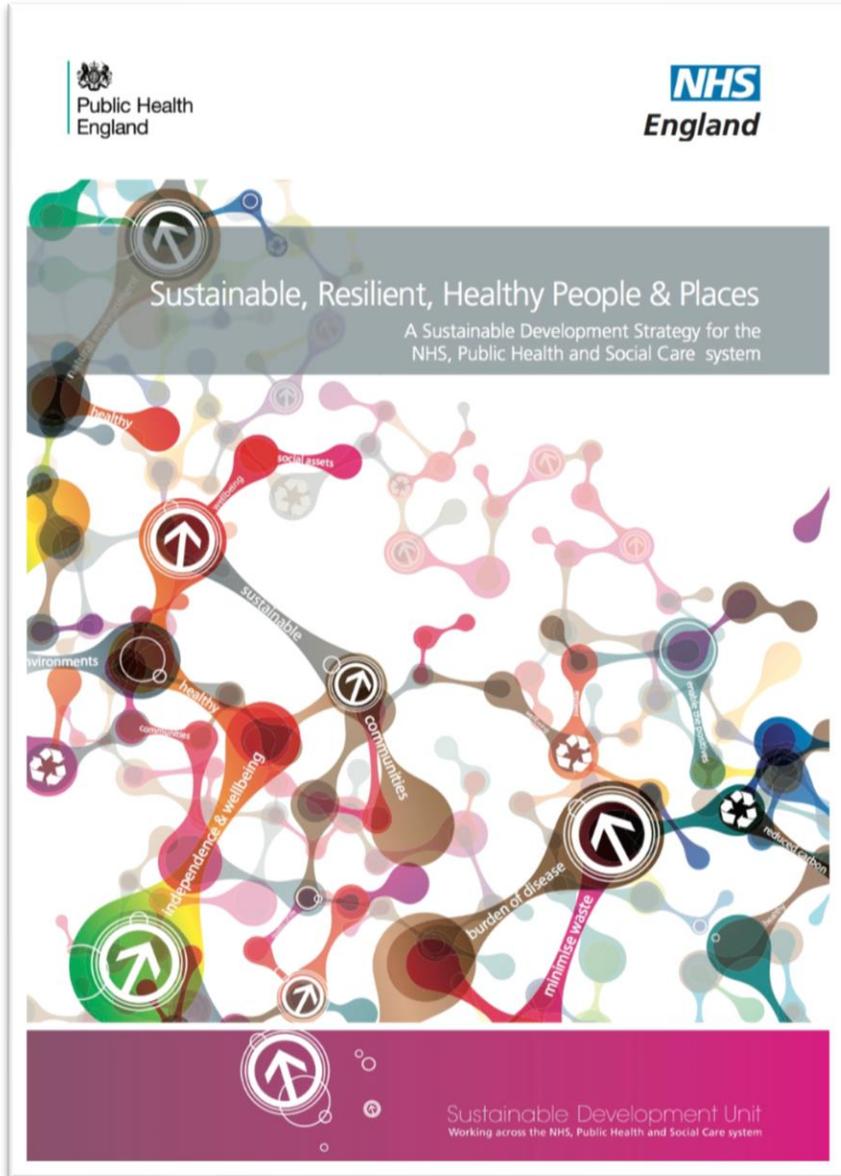
Q Visit, Oxford, 11 March 2020



Health service sustainability: scope?

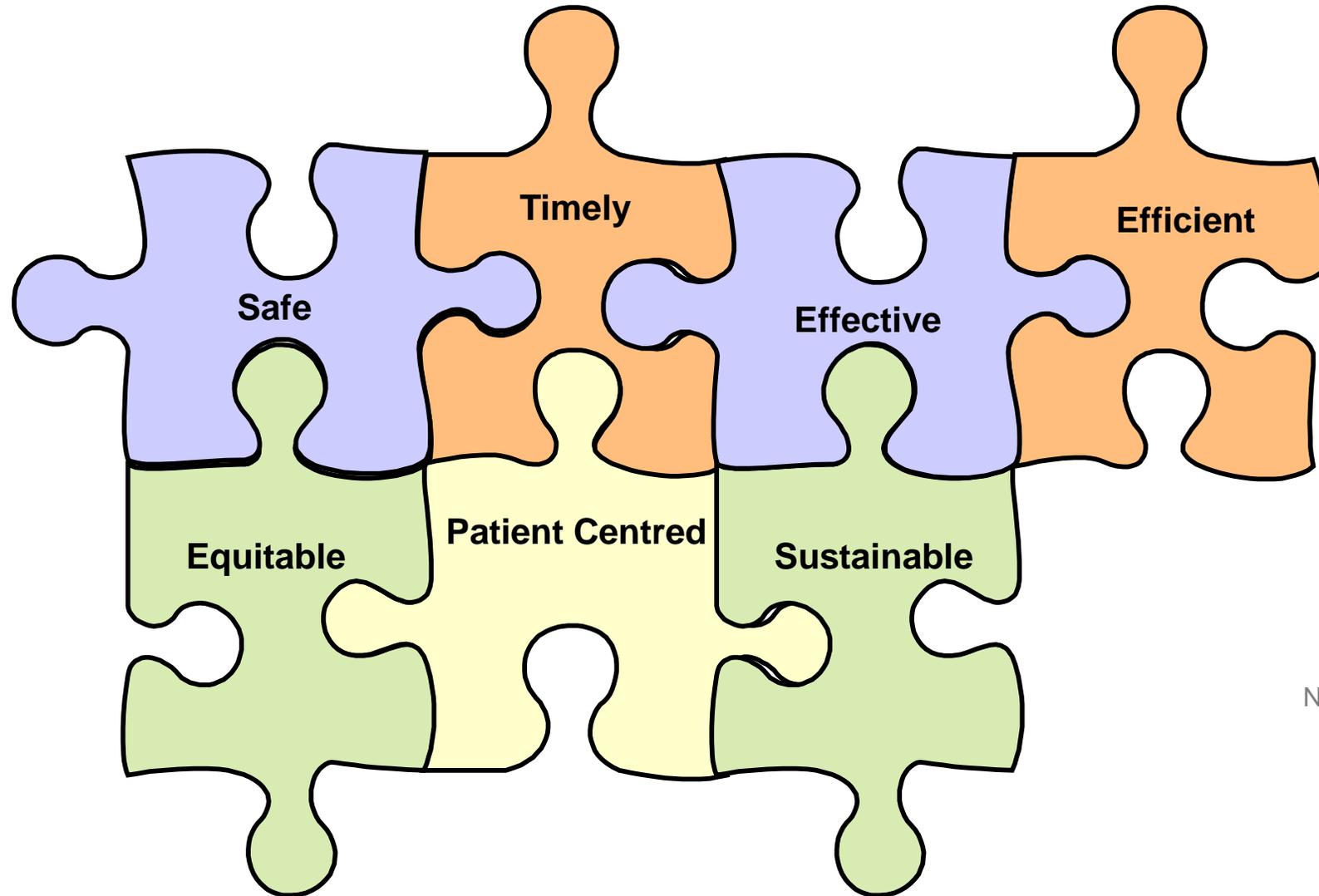
1. Protecting the health service for (current and) future generations
 - Will the NHS still be with us in 2025 / 2035?
2. Protecting health for (current and) future generations
 - Does healthcare activity build health – or undermine it?





“Our vision of sustainable health and care: A sustainable health and care system works within the available environmental and social resources protecting and improving **health** now and for future generations.”

Sustainability as a domain of quality



Dr Donal O'Donoghue
National Clinical Director for
Kidney Care 2007-13

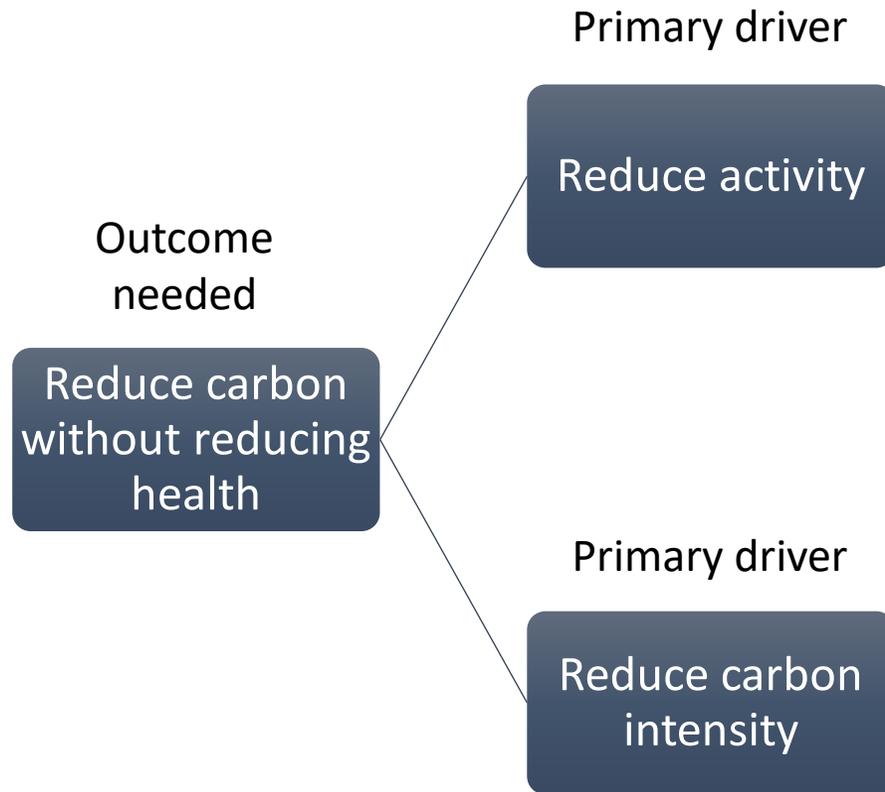
Royal College of Physicians

- “Sustainability is a characteristic of healthcare which must run through and moderate other domains”
- “Healthcare should be considered not only in terms of what can be delivered to an individual today, but also to the population in general and the patients of the future.”

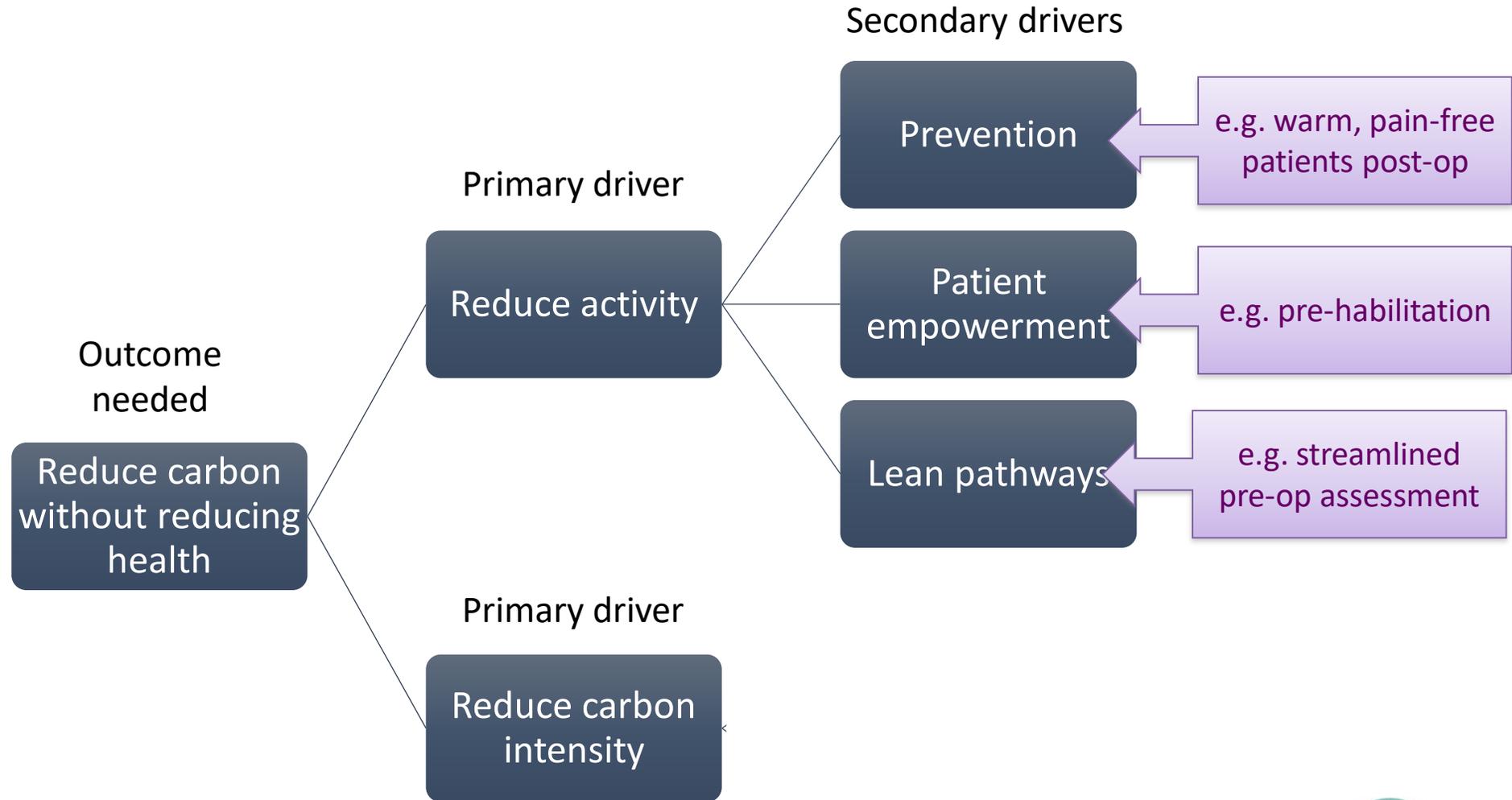
Atkinson S, Ingham J, Cheshire M, Went S. Defining quality and quality improvement.
Clin Med 2010;10:537–9.

CSH Principles of sustainable clinical practice

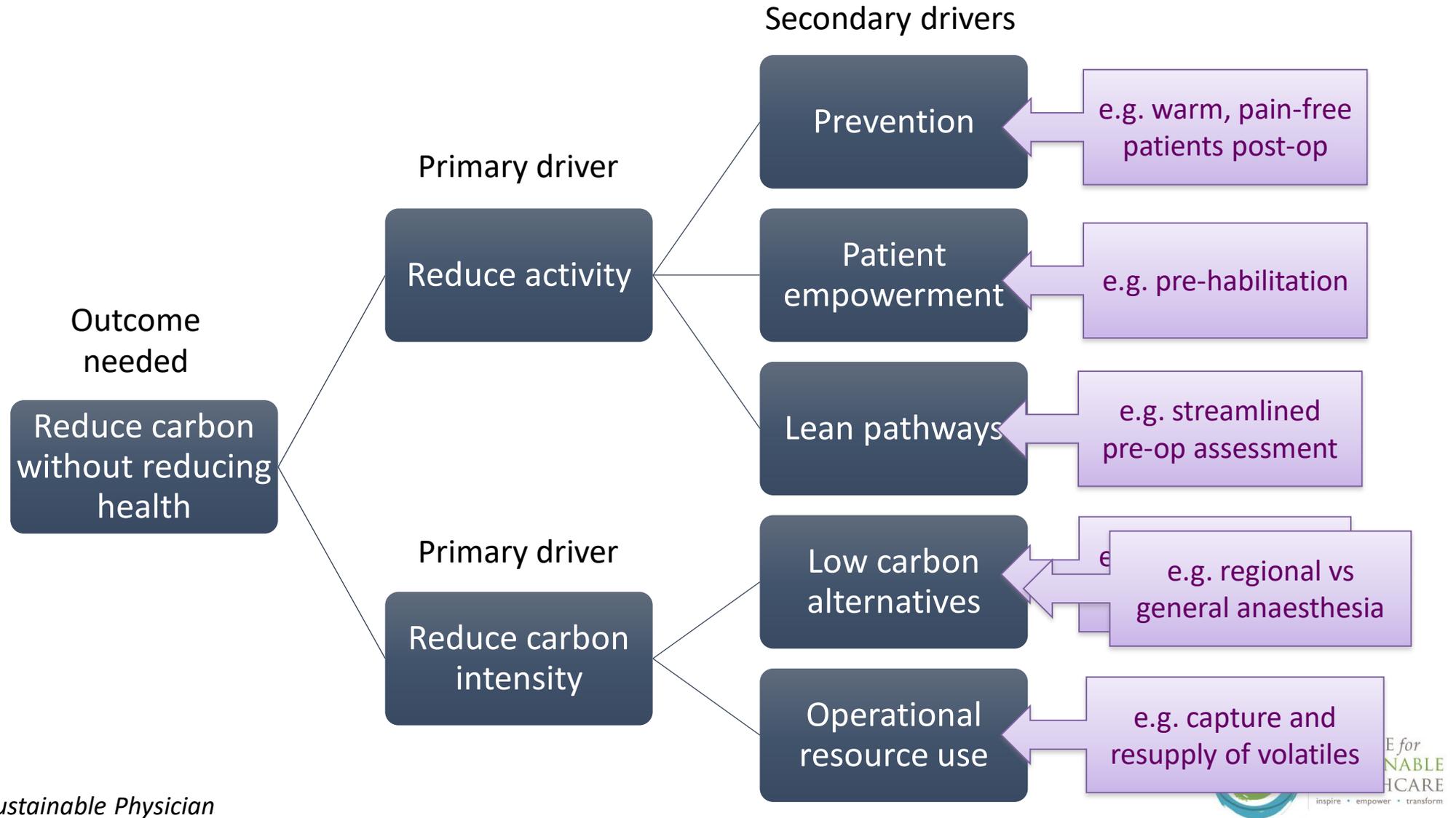
Secondary drivers



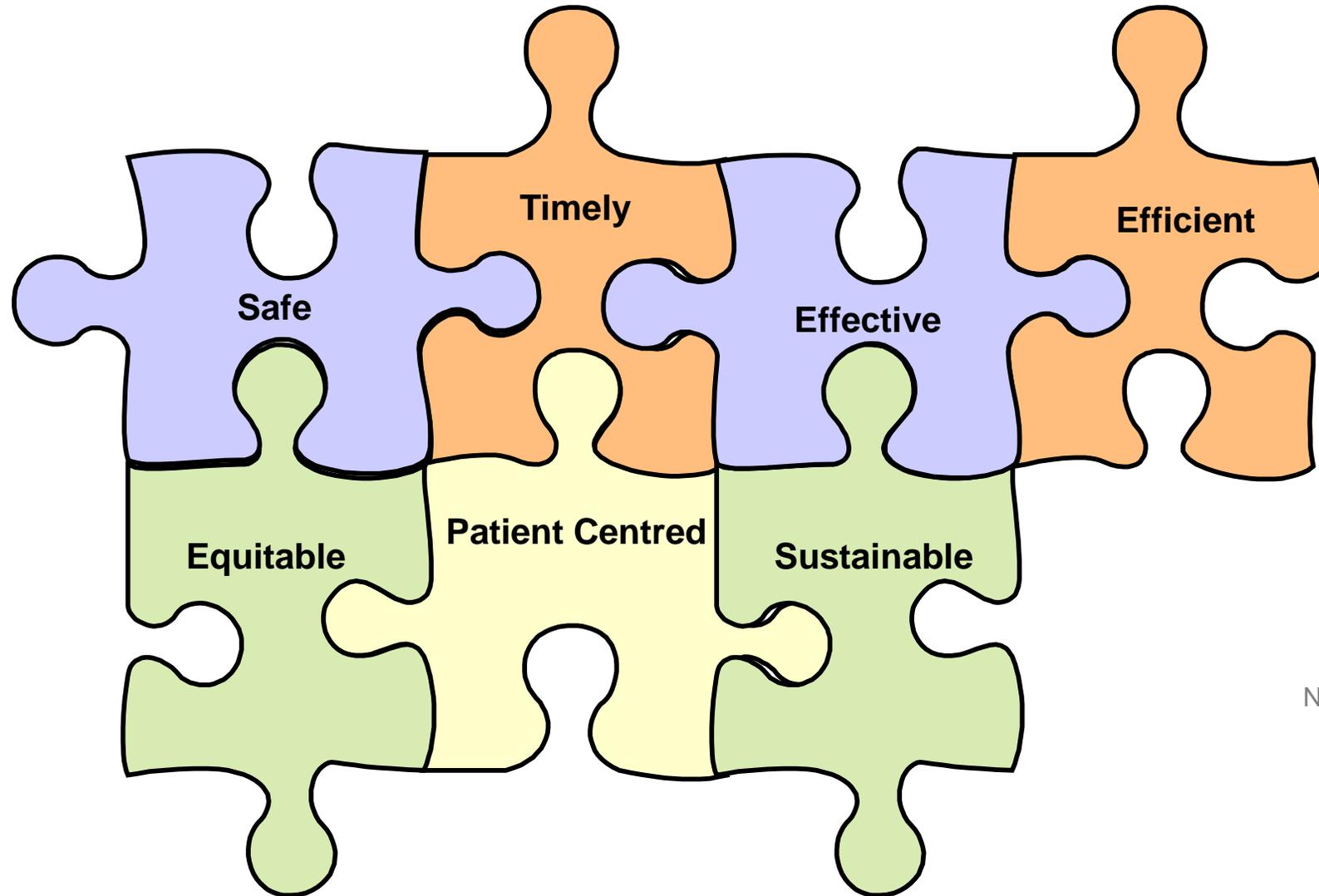
CSH Principles of sustainable clinical practice



CSH Principles of sustainable clinical practice

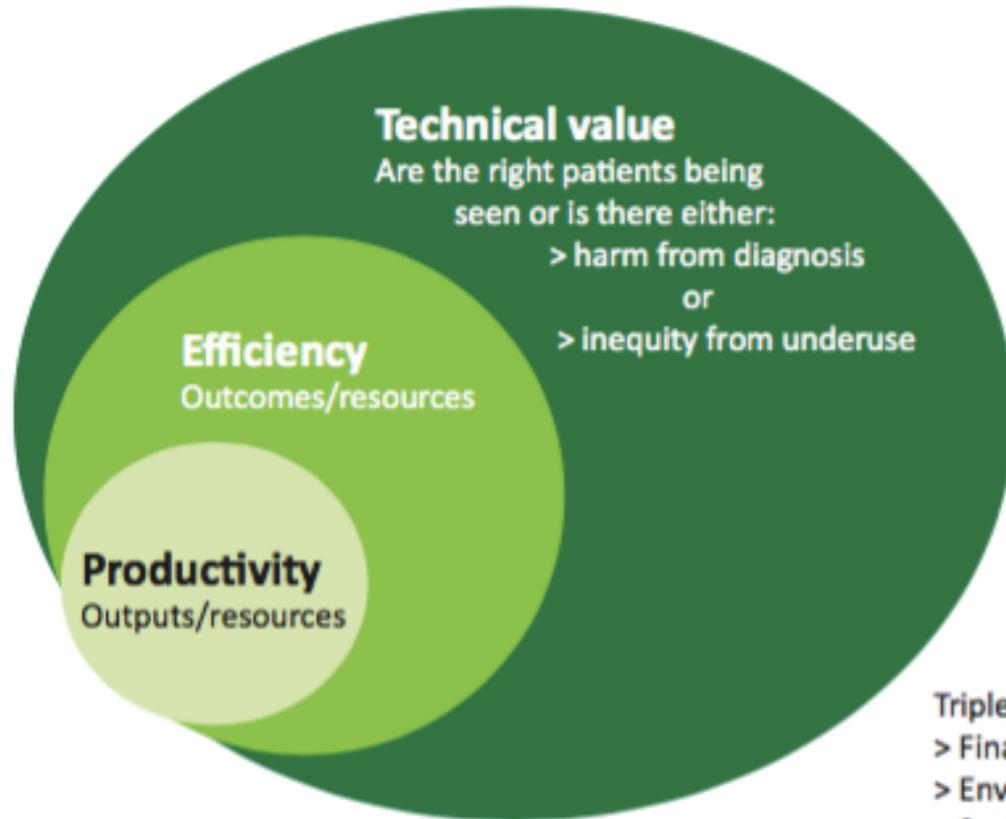


Sustainability as a domain of quality



Dr Donal O'Donoghue
National Clinical Director for
Kidney Care 2007-13

But quality is not enough - we
need to improve value



Triple resources
> Financial
> Environmental (carbon)
> Social (eg time – not only clinician time but also time of patients and carers)

Fig 2. Productivity, efficiency and technical value (adapted with permission of M Gray, University of Oxford): Muir Gray et al. *How to get better value healthcare*. Offox press.⁸

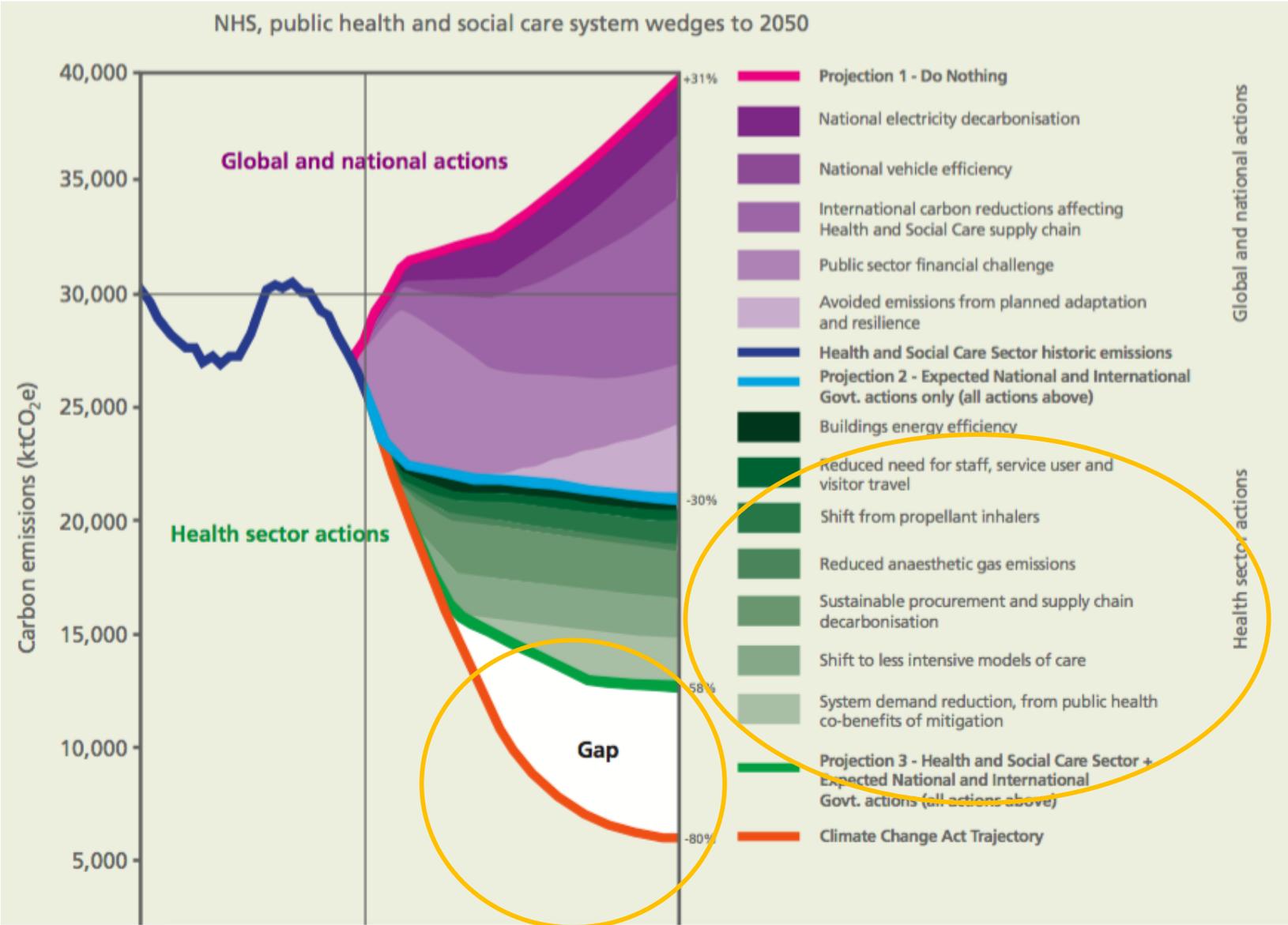
QUALITY IMPROVEMENT Sustainability in quality improvement: redefining value

Authors: Frances Mortimer,^A Jennifer Isherwood,^B Alexander Wilkinson^C and Emma Vaux^{D,E}

$$\text{Value} = \frac{\text{Outcomes for patients and populations}}{\text{Environmental + social + financial impacts (the 'triple bottom line')}}$$

Mortimer F, Isherwood J, Wilkinson A, Vaux E. Sustainability in quality improvement: redefining value. *Future Healthcare Journal*, 2018 Vol.5(2):88-93

How will 80% carbon reduction be achieved?



Require clinical leadership

Clinical innovation

Senior leadership

Patient outcomes

Patient experience

Core mission

Sustainability

Estates and facilities

Energy / carbon / cost
waste, travel

Secondary



What if... sustainability became a
mainstream part of quality
improvement?

QUALITY IMPROVEMENT Sustainability in quality improvement: redefining value

Authors: Frances Mortimer,^A Jennifer Isherwood,^B Alexander Wilkinson^C and Emma Vaux^{D,E}

The SusQI framework

Mortimer et al., Future Healthcare Journal 2018, Vol 5, No 2: 88-93

QUALITY IMPROVEMENT Sustainability in quality improvement: redefining value

Authors: Frances Mortimer,^A Jennifer Isherwood,^B Alexander Wilkinson^C and Emma Vaux^{D,E}

Table 2. Building sustainability into quality improvement ('SusQI'): intended benefits

QI element	Sustainability content	Intended benefits
1 Setting goals	Sustainability as a domain of quality; relationship to other domains	New motivation to contribute to QI, energy for change
2 Studying the system	Understanding environmental and social resource use / impacts; carbon hotspots in the NHS; 'seven capitals' matrix	Highlights wastes and opportunities which are often overlooked; stimulates radical thinking
3 Designing the improvement effort	The Centre for Sustainable Healthcare principles of sustainable clinical practice (prevention, patient empowerment and self-care, lean systems, low carbon alternatives) ^a – drivers and process changes	Directs towards highest value improvements, future proofing
4 Measuring impact / return on investment	Triple bottom line / sustainable value equation; measuring carbon	Drives sustainable change; allows benefits to be communicated to broader audience, not exclusively regarding financial cost-benefit

^aFrom Mortimer *et al*, 2010.¹² QI = quality improvement

Aim of Sustainable QI

- To maximise **sustainable value**:

$$\text{Value} = \frac{\text{Outcomes for patients and populations}}{\text{Environmental + social + financial impacts (the 'triple bottom line')}}$$

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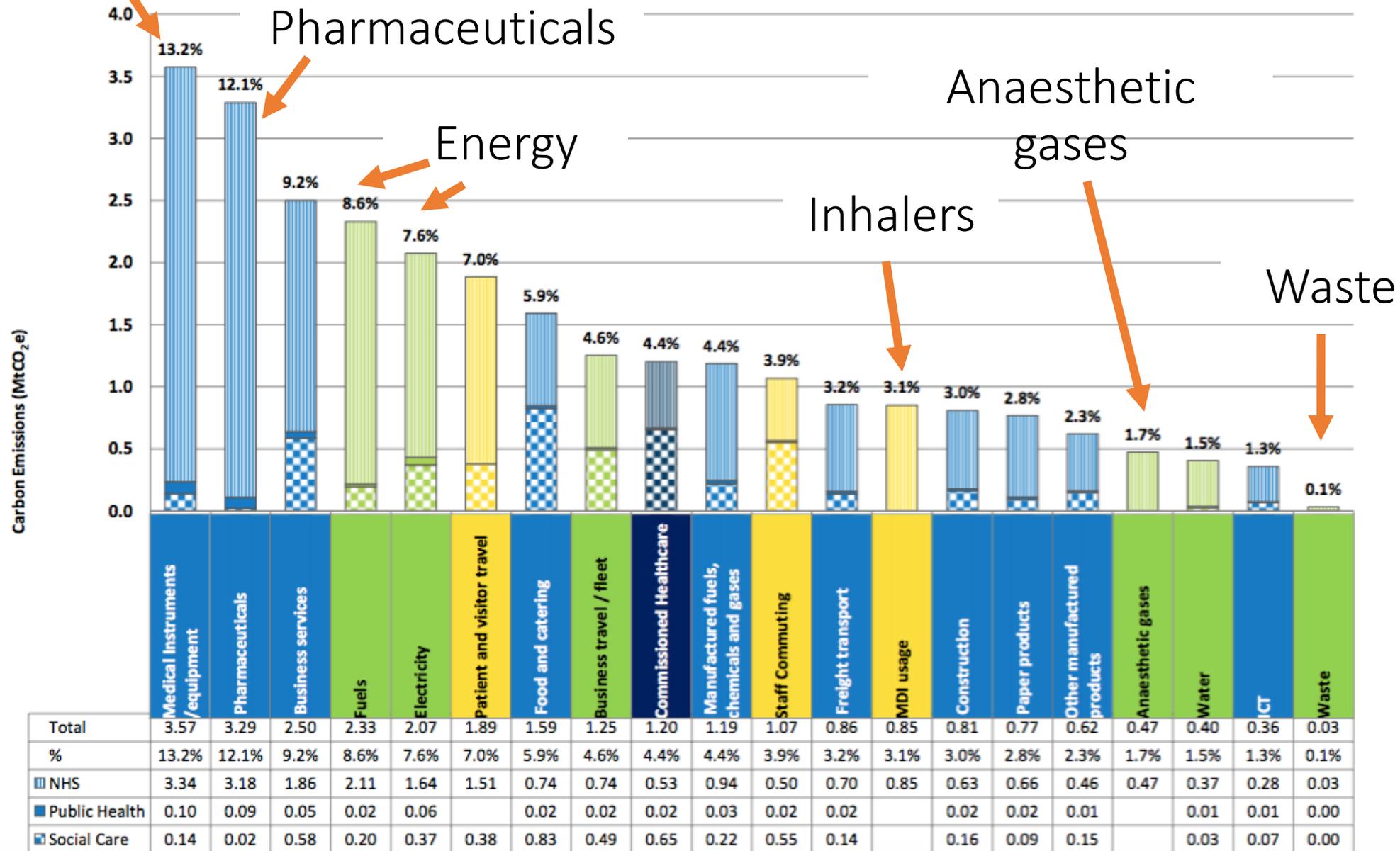
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Medical instruments

Figure 2. Health and Social care detailed breakdown 2017



SDU 2018. Reducing the use of natural resources in health and social care 2018 report

Environmental hotspots

Env impact	Hotspots
Greenhouse gas emissions	Inhalers, anaesthetic gases, medical equipment, pharmaceuticals, operating theatres, energy use
Air pollution	Staff travel, patient travel, energy use
Deforestation	Gloves - rubber plantations
Water consumption	Dialysis, laundry, cotton linen
Scarce resources	Conflict minerals in medical instruments
Plastic pollution	Single use (133,000 tonnes plastic/year)
Eco-toxicity (PBT)	Antibiotics, OCP, antidepressants, propofol
Ozone depletion	Nitrous oxide (maternity, emergency care, theatres)

Social impacts – on whom?



Patient



Staff



Carers



Dependants

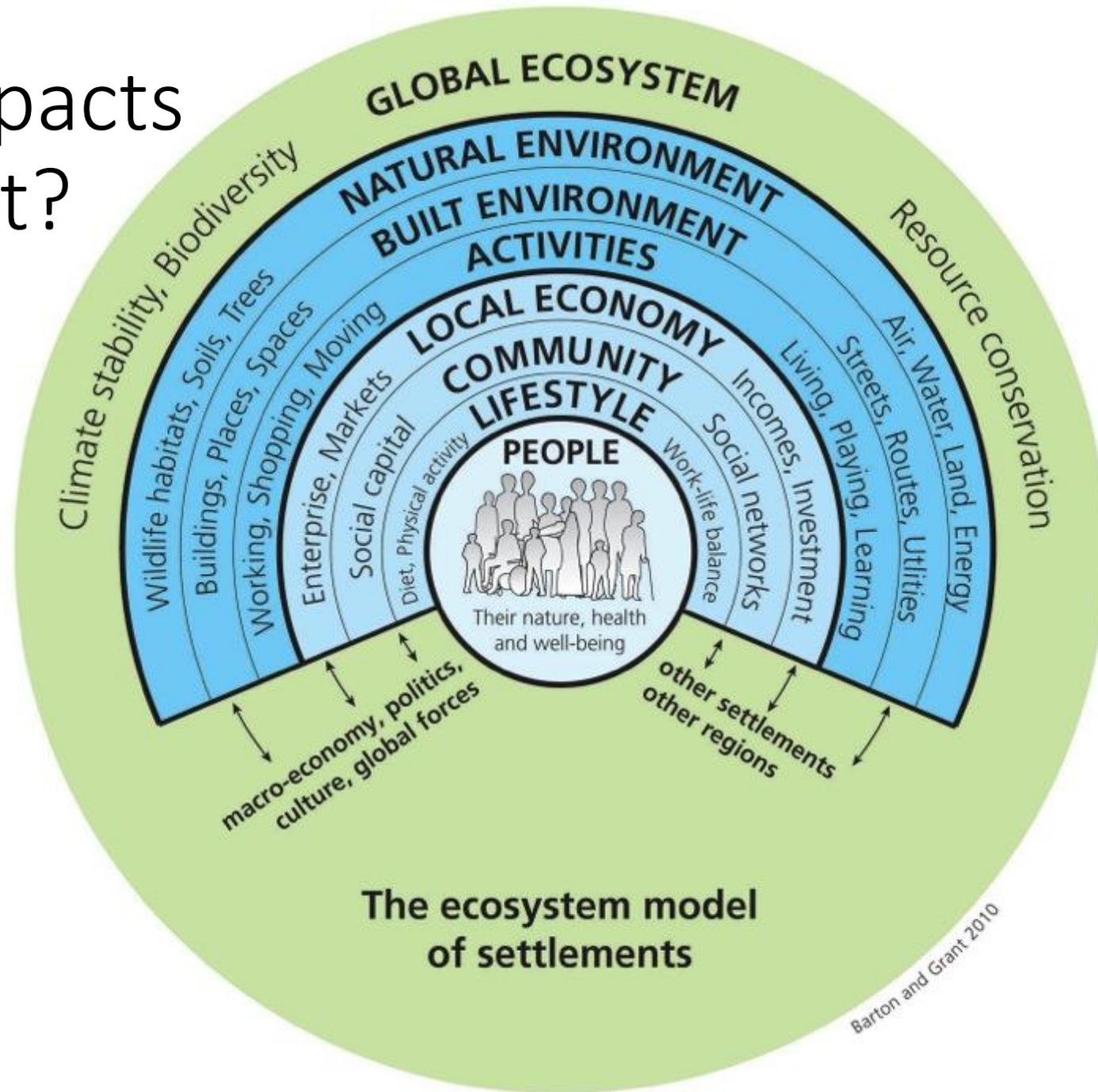


Local community



Distant communities (e.g. supply chain workers)

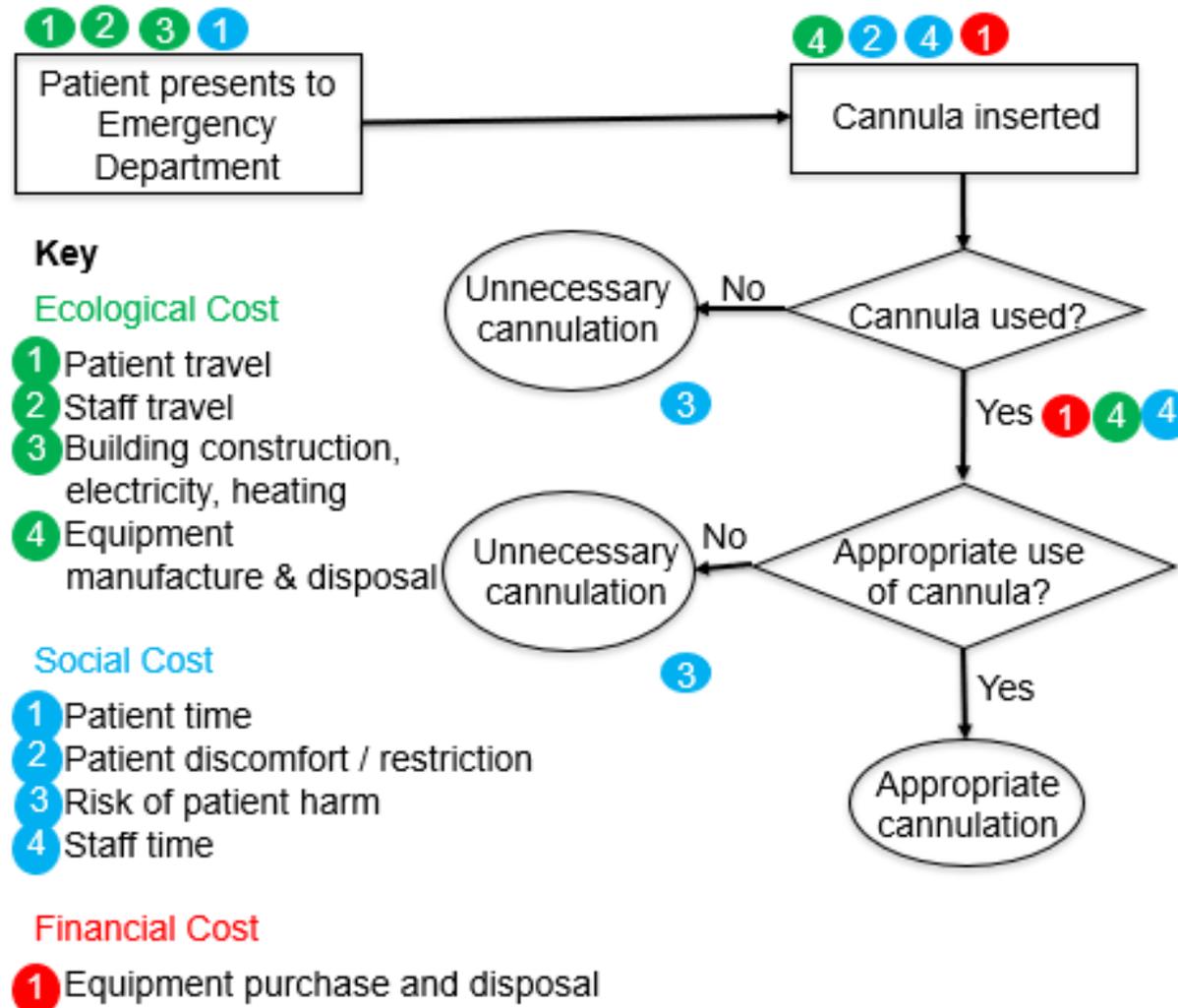
Social impacts – on what?



Scanning for social impacts

	Patients	Carers	Community	Supply chain	Staff
Housing					
Poverty					
Health					
Education					
Employment					
Safety/security					
Satisfaction					
Participation					
Social gradient					

Understanding env/soc/£ impacts: process map



QUALITY IMPROVEMENT Sustainability in quality improvement: redefining value

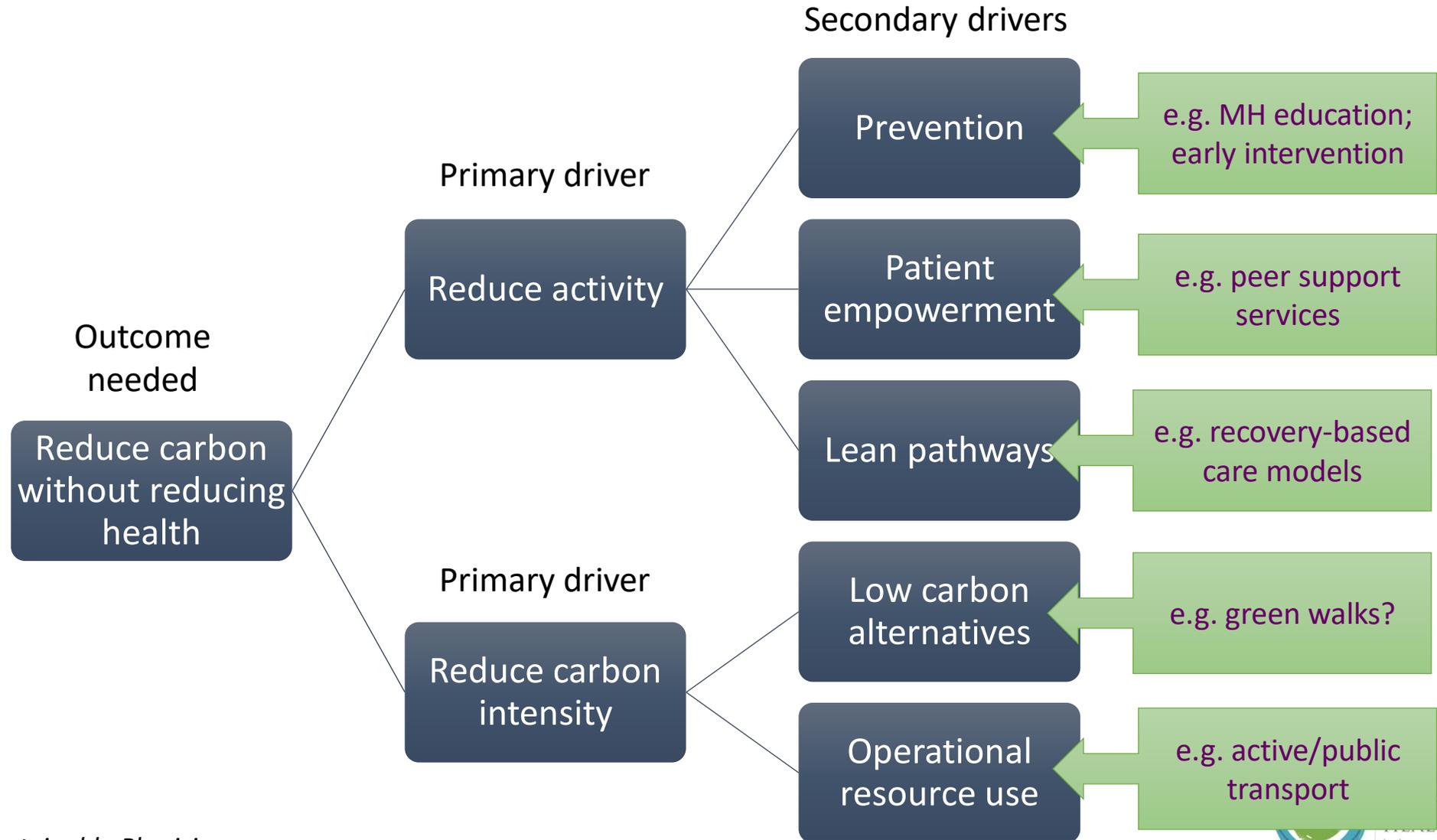
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Sustainable clinical practice: principles



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Measuring environmental costs - example

A primary care team noticed that some patients who were referred for hip and knee replacements were being referred back to the GP surgery after pre-operative assessment at the local hospital. This was because parameters, such as blood pressure, were either outside the target range or were not communicated properly in the referral information. An audit revealed that 1 in 6 patients looped through the system – 10/ year.

Activity	Outcome	£'s	CO ₂ e	Social
Extra GP consult	[delay to surgery]	£45 ¹	18 kg ²	Patient & carer time/ stress
Extra Hospital consult	[delay to surgery]	£112 ¹	23 kg ²	Patient & carer time/ stress (parking...)
Total (for 10 loops)		£1570	410 kg	

1. Unit Costs of Health and Care, PSSRU, December 2015. Available at: <http://www.pssru.ac.uk/project-pages/unit-costs/2015/index.php>
2. Carbon Hotspots update for the health and care sector in England 2015, Sustainable Development Unit, January 2016.



Social Impacts – identifying outcome measures

Group affected	Impact area	Outcome measure
<i>e.g. carers</i>	<i>employment</i>	<i>% in employment / time off work</i>
<i>e.g. staff</i>	<i>health</i>	<i>sickness / absence</i>

Thinking sustainably within a QI project

1. Apply sustainability approach at the different stages of **ANY** project

2. Choose a project area that **relates closely to sustainability**, e.g.
 - a. Prevention, patient empowerment, etc.
 - b. Reducing pharmaceutical waste
 - c. Reducing over-investigation / over-treatment

SusQI open access learning resources

Sustainability in Quality Improvement: Introduction

The goal of sustainable healthcare is to meet the health needs of patients and populations today and in the future. It brings both a longer term and a broader, more holistic perspective to healthcare management and improvement: we need to make sure that we are considering the needs of the entire population, not just the individual patient; we need to think about preventing illness and building health and resilience; we need to make best possible use of finite resources – not just financial, but also environmental and social.

Sustainability has been recognised as a domain of quality in healthcare^{1,2}, and building it into quality improvement is a practical way to drive incremental change towards a more ethical, sustainable health system.

These learning resources, based on the SusQI framework^{3,4}, are designed to help you to:

1. Set sustainable goals for your quality improvement project, namely to deliver maximum health gain with minimum financial cost and harmful environmental impacts, whilst adding social value at every opportunity. [SusQI resource: Introduction]
2. Recognise the use of environmental and social resources in your current service, and identify opportunities to improve. [SusQI resource: Studying the System; Sexual Health Patient Pathway]
3. Design your project using sustainability principles (prevention, empowerment, lean pathways, opportunities to improve) to achieve the greatest benefit. [SusQI resource: Designing the Improvement Effort]
4. Measure the impact of your project on sustainable value. [SusQI resource: Measuring the carbon footprint of a QI project; Measuring the social impacts of a QI project]

VALUE = Outcomes for patients & populations
Environmental + Social + Financial Impacts
 (i.e. Triple bottom line)

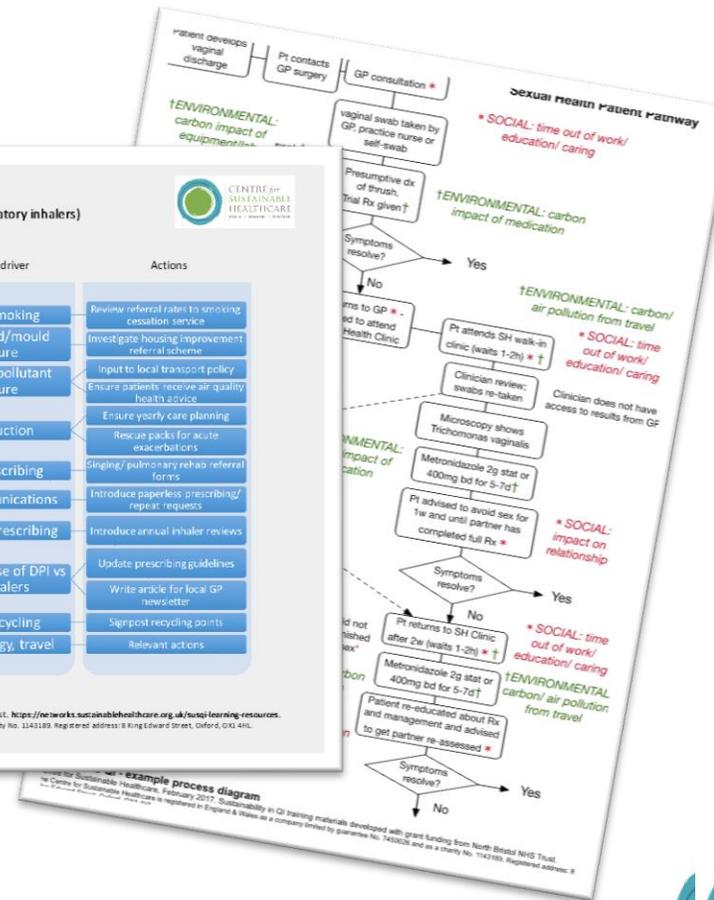
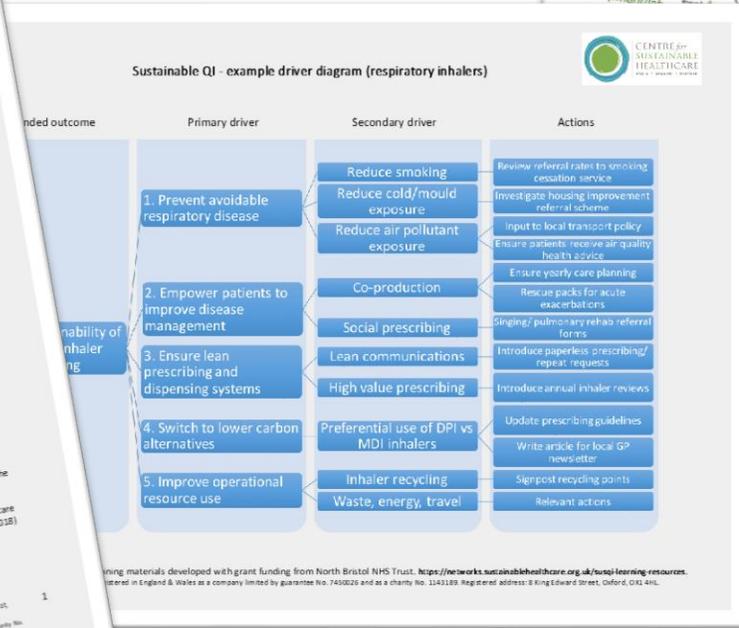
[SusQI resources: Measuring the carbon footprint of a QI project; You may also decide to measure the social impacts of a QI project]

You can apply a sustainability approach at the different stages of any project, such as prevention, patient empowerment, choosing a project area that relates closely to sustainability, such as prevention, patient empowerment, reducing pharmaceutical waste or reducing over-investigation / over-treatment.

[SusQI general resources: SusQI slide set; Project review template]

For more information and support on sustainability in quality improvement, please contact us at the Centre for Sustainable Healthcare: info@sustainablehealthcare.org.uk
 Dr Frances Mortimer, Centre for Sustainable Healthcare
 February 2017 (updated October 2018)

1. A strategy for quality 2015 (and beyond). Royal College of Physicians (2015) 2. Williams, S. et al. Defining Quality and Quality Improvement. Current Medical Research and Practice. 2012; 1(4): 209-217 3. Mortimer, F. et al. Defining Quality and Quality Improvement. Healthcare Quality. 2016; 1(4): 209-217 4. Mortimer, F. et al. Sustainability in Quality Improvement: Measuring Impacts. Future Healthcare Journal. 2018; 1(4): 209-217



<http://networks.sustainablehealthcare.org.uk/sus-qi-resources>



SusQI: benefits

- QI methodology provides a practical approach for health professionals to address environmental and ethical issues
- Sustainable healthcare can harness new energy and enthusiasm for QI, stimulate creative thinking

Thank you!

<http://sustainablehealthcare.org.uk/susqi>

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Exercise: studying the system –
identifying environmental and
social impacts

Asthma scenario

A thirteen-year-old boy, Tom, is brought by his mother to the Emergency Department at 3am with severe shortness of breath and wheeze. He has a history of asthma diagnosed at age 5 and this is his third similar presentation in six months, although previously his asthma had been well-controlled. His regular medications are beclomethasone inhaler (MDI) 2 puffs twice per day, montelukast (tablets) and salbutamol inhaler (Ventolin MDI) 2 puffs as needed. He lives in inner Birmingham with his mother, a primary school teacher, and his younger brother, aged 10. They have no pets.

In the Emergency Department, he is treated with oxygen, nebulised salbutamol and oral steroids, and transferred to the paediatric ward, from where he is discharged the following day. His mother is requested to make a follow up appointment with the GP in a week's time.

Tom returns to school on Friday. The following Wednesday he attends an appointment with his GP. Following an emergency earlier in the day, the surgery is running over an hour behind schedule. When she finally sees him, the GP notices that Tom has missed two appointments with the practice's asthma nurse in the preceding months. She adjusts his regular medications, replacing the montelukast tablets with a salmeterol inhaler (MDI) and arranges an asthma nurse review for the following week, which the boy attends.

Tom's asthma story: annotate process map with **environmental impacts**

- Carbon footprint
 - Travel
 - Energy use
 - Supply chain:
 - Pharmaceuticals, medical equipment and supplies, non-medical equipment, waste disposal
- Non-carbon environmental impacts
 - Air pollution, deforestation, water consumption, eco-toxicity, plastic pollution, ozone depletion, scarce resources

Which are most important?

Asthma scenario continued...

The asthma nurse establishes that Tom has not been taking his preventer inhaler regularly as he did not feel any benefit, although his mother has been collecting them from the pharmacy along with his salbutamol inhalers. On observation, his inhaler technique is good when using a spacer but poor without. Tom admits that he does not generally use a spacer at home and finds it embarrassing to carry or use his inhaler at all when at school or doing sports.

His mother is concerned that Tom seems withdrawn and less interested in spending time with his friends over recent months. He used to enjoy football but has been dropped from the team after missing training sessions due to his asthma. He has also missed quite a few days of school.

Tom's grandmother helps out with child care (e.g. looking after younger brother while Tom is in hospital). They live near a park, in rented accommodation which is poorly maintained and Tom's mother is worried that mould in the living room may be contributing to his poor asthma control.



Tom's asthma story: now consider **social resources**

1. Social assets: which relationships or physical assets within the community are already contributing to - or could be harnessed to contribute to - Tom's care/overall wellbeing?
2. Social impacts: how is Tom's care currently impacting on the social circumstances of the people involved (positively or negatively)?

Which impacts are most important?

Thank you!

<http://sustainablehealthcare.org.uk/susqi>

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Sustainability in QI Education 2019-21

Dr. Frances Mortimer

Medical Director, Centre for Sustainable Healthcare, Oxford, UK

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Q Visit, Oxford, 11 March 2020



“my students (working nurses) on the ICU nursing course are using the SusQI framework for their quality improvement project assignment. I’m marking essays now and adding in sustainability as a component of quality has enhanced the academic writing this year – it has also prompted the students to develop more interesting projects”

Dr Heather Baid, University of Brighton

Undergraduate education: GMC Outcomes for Graduates 2018

- 25 Newly qualified doctors must be able to apply the principles, methods and knowledge of population health and the improvement of health and **sustainable healthcare** to medical practice.

- 5 Newly qualified doctors must demonstrate that they can practise safely. They must participate in and promote activity to **improve the quality and safety of patient care** and clinical outcomes.

Quality improvement curriculum



1E Apply sustainable healthcare principles taking into account the financial, environmental and social impact of health services.

Developing quality improvement into practice. Academy of Medical Royal Colleges (2019)



Sustainability in QI Education project (2019-21)

- 1. Demonstrate** the inclusion of sustainable healthcare principles within undergraduate and postgraduate health professions education on QI
- 2. Evaluate** the impact on student learning, including engagement with QI
- 3. Accelerate the adoption** of successful approaches by UK universities, Foundation Schools and other education providers



Dr Stuart D'Arch Smith
CSH Education Fellow
2019-20



Project scope

Pilots: we will demonstrate inclusion of sustainability in at least one QI education programme within the UK for each of:

- Undergraduate medical students (KCL, Bristol +/- Newcastle, Brighton)
- Postgraduate doctors in training (Severn Foundation School, HEE North West?)
- Nursing or allied health professionals (Pharmacists (national), nurses (Brighton))

Dissemination: we will share learning across the UK and beyond. Education resources generated through the project will be open-access and will be widely disseminated.



KCL pilot – Y4 QI module (6 months)

- 1. Review** current QI teaching and materials; design and integrate SusQI teaching & materials.
- 2. Deliver** SusQI training to students and faculty.
- 3. Evaluate** impacts on student learning, student engagement, application of SusQI methodology.
- 4. Share** learning through webinars, open-access resources & seminars:
 - *Education Masterclass 20 March 2020*
 - *AMEE workshop September 2020*
 - *conference abstracts, possible GMC workshop May 2020*

Bristol pilot

- 3 week module delivered by NUS & CSH for up to 12 students in Y2
- Structured teaching on sustainable healthcare, SusQI and change management
- Placement in a GP practice or NHS Trust to develop a small project, practising QI methods, e.g.
 - Inhaler recycling, encouraging DPI > MDI
 - Sustainability of menstrual products
 - De-prescribing opioids
 - Promoting breastfeeding
- Assessment by: in-depth project report & presentation

Bristol SSC – what we have learned

- Students want to learn about sustainable healthcare if relevant to clinical care and working in the NHS.
- Invest in finding willing host practices and liaise closely with them.
- Provide choice – but with a clear starting point.
- Manage expectations of what can be achieved in a short placement – if possible link to an ongoing effort.
- Students feel empowered by having made a change.

Bristol SSC – what students say:

“This SSC was a great addition to my medical course, it was a lot of work at times, but I felt like I have really made a difference, and due to the nature of my project I felt like I was acting as a professional in the NHS which was very exciting and rewarding.”

“A doctor has a responsibility as someone who is respected by the community to pioneer changes in practice and influence others to do the same...I think it will change the way I will practise medicine and will inform many decisions I make in the future.”

Severn Foundation School pilot

- Foundation Doctors have to do QI projects anyhow; anecdotally, many find this a tick-box exercise; difficult to do something meaningful on a temporary placement.
- Pilot:
 1. Optional SusQI training day offered through the Foundation School training programme on 2 March, including plan-your-project workshop
 2. Call out to potential supervisors with an interest in SusQI; supervisor webinar held 19 Feb
 3. Matching FDs to supervisors/projects
 4. Project support as requested / capacity allows
 5. Evaluation

Evaluation

We are developing tools to enable evaluation of:

1. Quality of content, format, delivery of teaching – to inform improvements
2. Engagement of learners in QI +/- SusQI
3. Applied learning – evidence that SusQI methods are being used
4. Transformative learning for participants
5. [Impact on sustainable value of healthcare systems/processes addressed – probably out of scope this time]

...with support from Dr. Kathleen Leedham-Green at the Medical Education Research Unit (MERU), Imperial College



Transformative learning:

“This framework has radically altered how I approach quality improvement, in how I deliver Quality Improvement to the students I teach, in my own practice and in how I appraise the work of others”

Dr. Noreen Ryan, Domain Lead for Quality Healthcare, Imperial College London School of Medicine

What makes a good pilot site?

- Established/planned QI education programme – core curriculum
- Willing to integrate sustainability rather than treat as stand-alone
- Access to learners and educators/supervisors
- Willing to evaluate
- Adds to existing pilots

Thank you!

<http://sustainablehealthcare.org.uk/susqi>

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[@FrancesMortimer](#) [#SusQI](#)



Confidence in carbon footprinting



CENTRE *for*
SUSTAINABLE
HEALTHCARE
inspire • empower • transform

Ingeborg Steinbach
Centre for Sustainable Healthcare
Q-visit

11th March 2020

Overview

To introduce methodologies for calculating a carbon footprint

To introduce the process of carbon footprinting

To practice carbon footprinting on an example

Triple Bottom Line

$$\text{Sustainable value} = \frac{\text{outcomes}}{\text{environmental + social + financial costs (the "triple bottom line")}}$$

What do we understand by carbon footprint?

Carbon footprint

- is the **sum of direct and indirect greenhouse gas emissions** which are attributable to a given process, product or organisation.
- Usually includes the **7 greenhouse gases** covered by the Kyoto Protocol
- Is expressed in carbon dioxide equivalents (**CO₂e**)

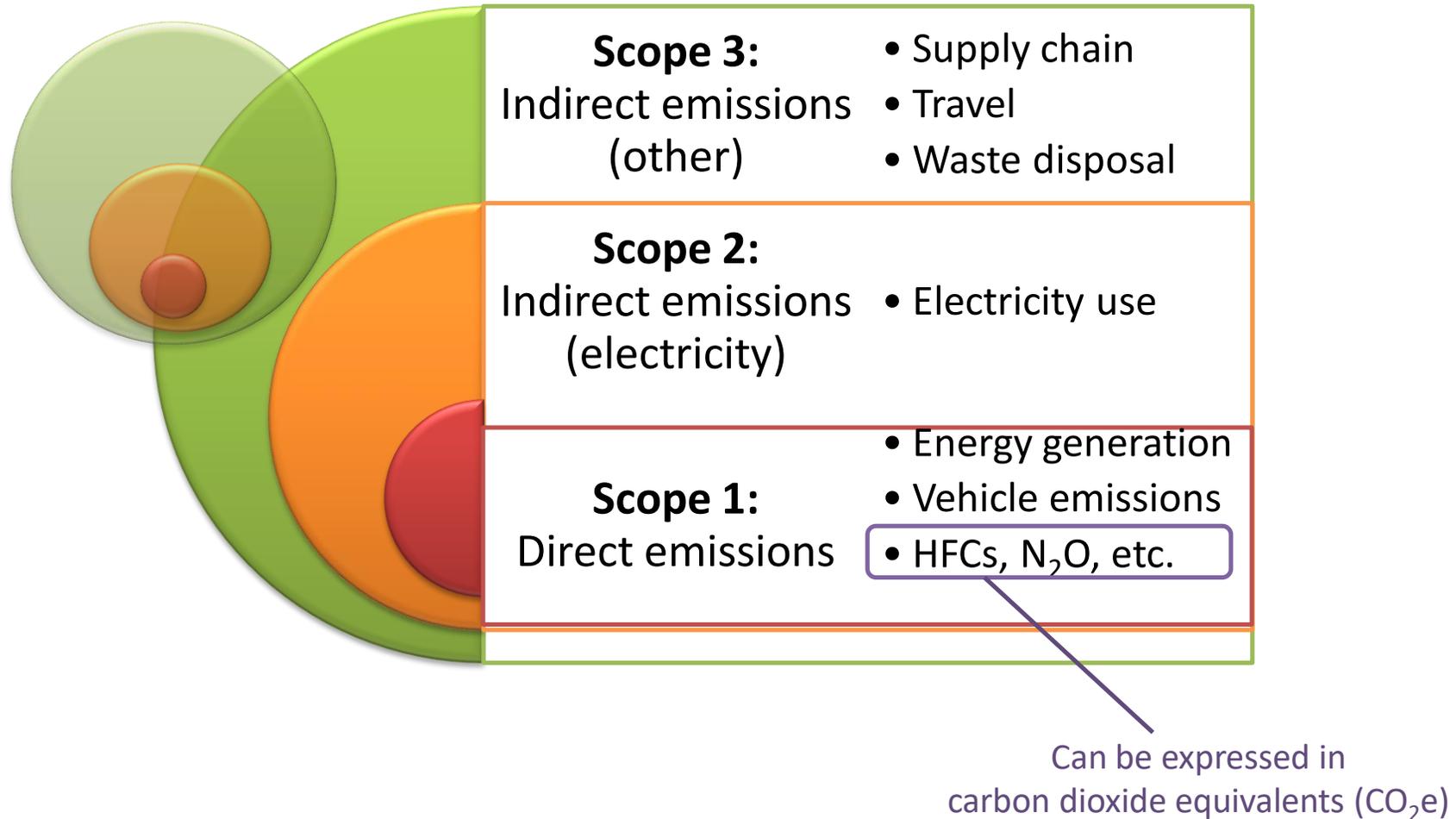
Sorting game

Please sort the cards in order of the size of the carbon footprint!

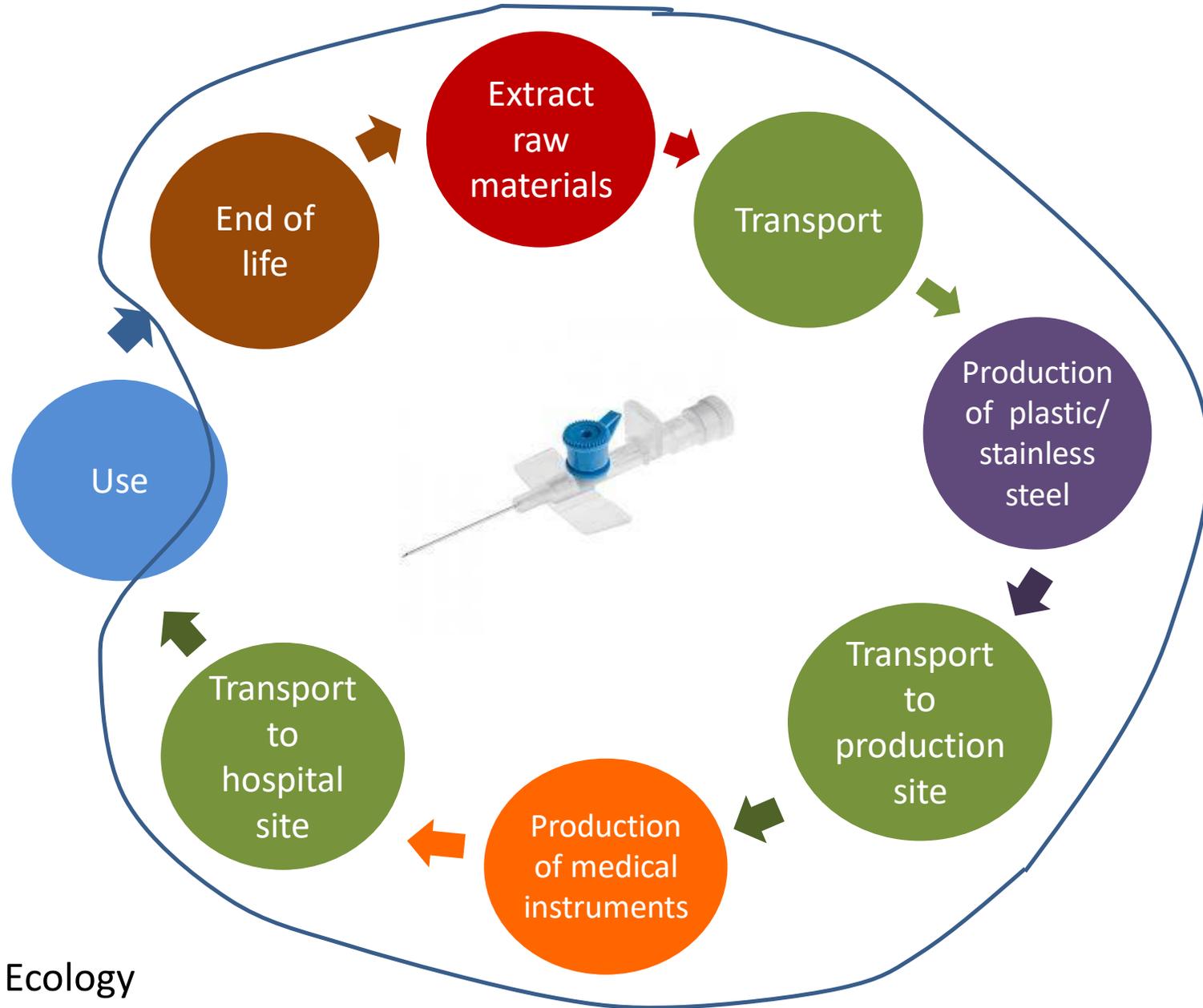
Items/processes	kgCO2e
1 email referral	0.004
1 banana	0.080
1 * 500ml bottle of water	0.160
1 letter referral (virgin paper & disposed off at landfill)	0.200
1 large cappucino	0.235
1 cannula	0.540
1 toilet roll (virgin paper)	0.730
1 GP appointment	6
1 pair of jeans	6
1 Salamol inhaler	10
1 outpatient appointment	23
1 inpatient day - low intensity	37.9
1 return journey Oxford - London in an averaged sized car	40
1 cataract surgery in the UK	180
1 litre of Desflurane	3,720

Carbon footprint: what is included?

(operational boundaries)



Embodied carbon in medical instruments



Main methods for carbon footprinting

Top down
input-output



Bottom up
process-based

Hybrid

Environmental Input Output Analysis (EIOA)

Emissions factors applied to spend in different economic sectors

Process-based Lifecycle Analysis (PBLCA)

Emissions factors applied to components of a process or product, e.g. materials, energy use

EIOA

Pro: inclusive, easy and inexpensive

Con: generic assumptions about the supply chain -> emissions factors not very specific, data sets not comprehensive

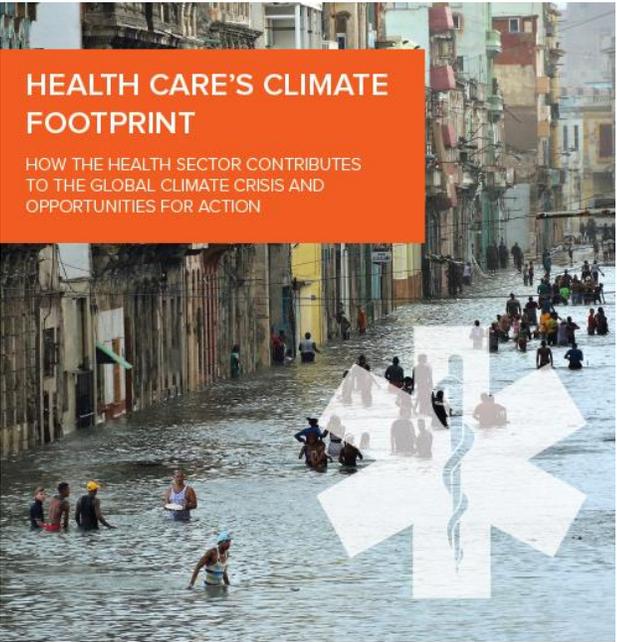
PBLCA

Pro: emissions factors more specific

Con: potential to be very specific, but requires lots of resources; truncation errors

Carbon footprint of healthcare sector HCWH vs SDU

42 mio tonnes CO2e
(2014)



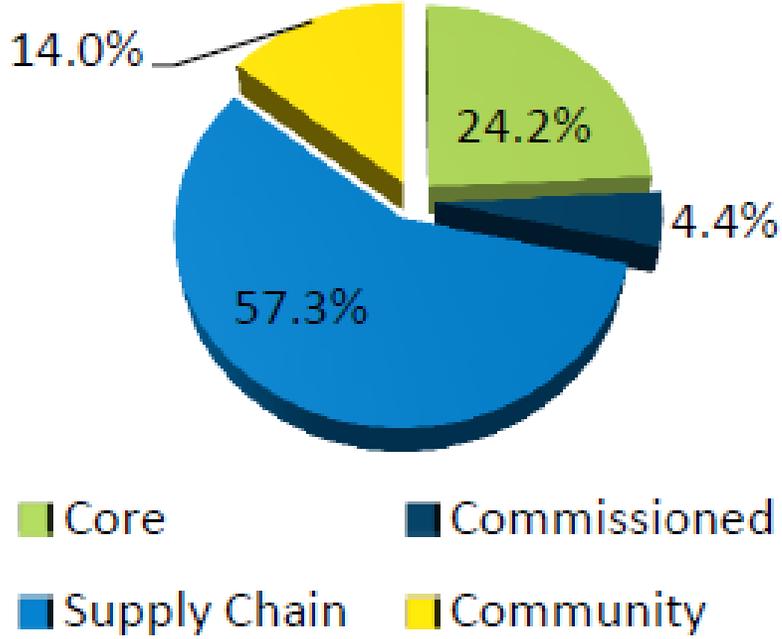
ARUP

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

Produced in collaboration with Arup
September 2019

27 mio tonnes of CO2e
(2017)

Figure 3. 2017 breakdown of HSC carbon emissions



SDU 2018. Reducing the use of natural resources in health and social care

SDU (2018) - Hybrid Methodology

Table 2. Detailed carbon Aol description

Area	Scope	Method
Core	The direct impact from the entire health and social care system where we have significant control, such as the use of utilities, fugitive emissions and business/fleet mileage	Applying to BEIS conversion factors to usage data from across the system. For core impacts from Public Health and Social care uses the MRIO process. Non-provider anaesthetic gases are based on NAEI data.
Commissioned	Commissioned healthcare covers the health and care procured by individuals outside of the NHS system	For all organisations in scope, the MRIO process is used
Supply chain	The impact of the goods, services and infrastructure procured by the health and social care sector	Using a Multi Region Input Output calculation method (MRIO), carbon intensities have been calculated using expenditure and carbon emissions from different economic sectors.
Community	The support and influence the health and social care system can have to help the community, patients and staff make healthier choices e.g. commuting and patient travel as well as the fugitive emissions from the use of Pressurised Meter Dose Inhalers (pMDI).	A mixture of Department for Transport, SDU and organisation level data is used for travel distances and applied to BEIS conversion factors. NAEI data is used for inhaler usage.

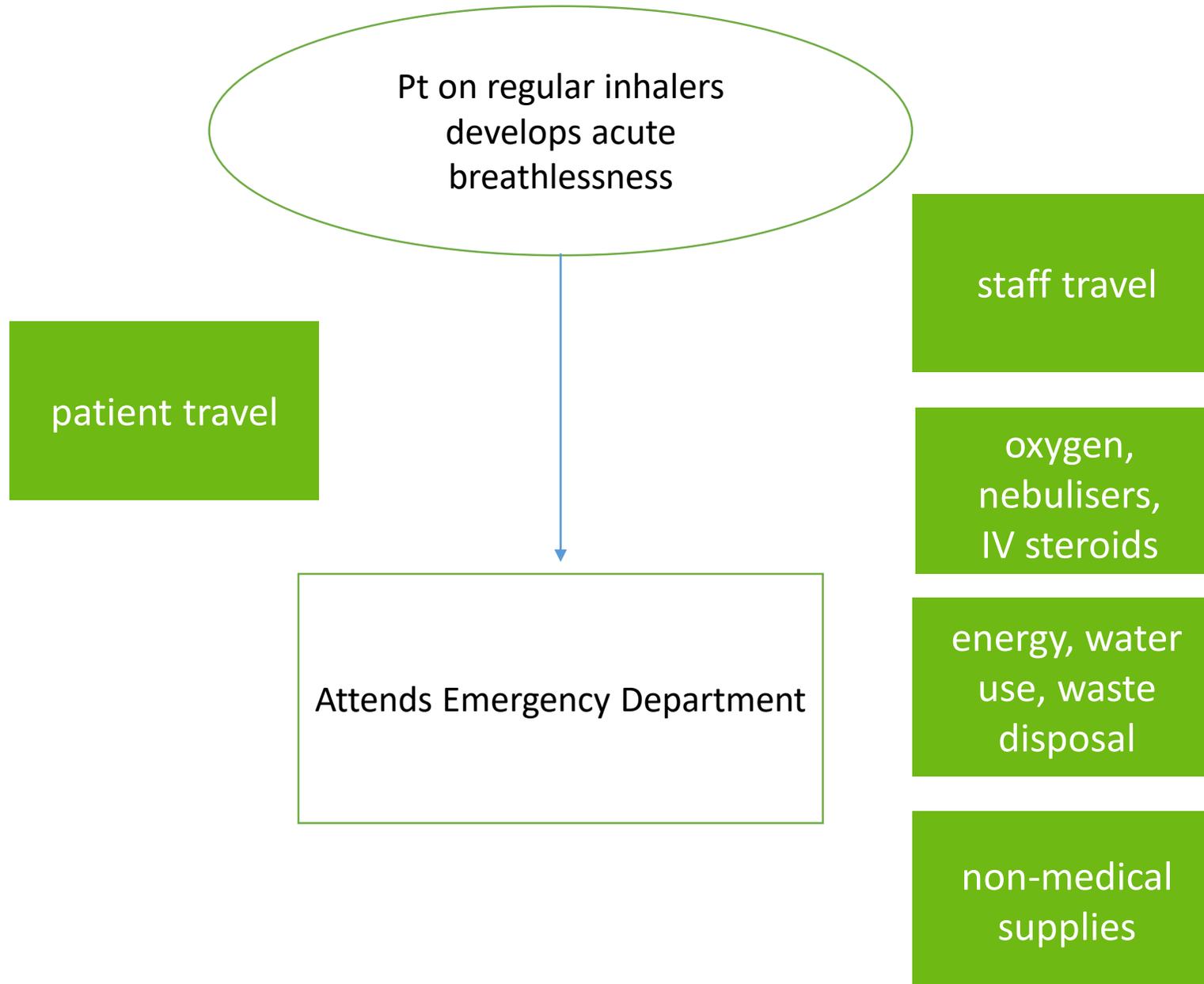
Steps involved

1. Define the goal and scope of the study

- Do you want to understand the make-up of the carbon footprint of an entire service?
- Or do you just quantify the impact of your specific QI project?
- Will you want to compare your QI project with other projects and services?
- Or do you want to just compare before and after the change?

Steps involved

1. Define the goal and scope of the study
2. Identify the resources used
(set boundaries, create inventory)
 - * Patient and staff travel
 - * Energy (heating, electricity)
 - * Procurement: Pharmaceuticals, medical equipment/supplies, non-medical equipment/supplies
 - * Water use
 - * Waste disposal



Steps involved

1. Define the goal and scope of the study
2. Identify the resources used
(set boundaries, create inventory)
 - 2.1 Identify what data is available

Steps involved

1. Define the goal and scope of the study
2. Identify the resources used
(set boundaries, create inventory)
 - 2.1 Identify what data is available
 - 2.2 Check what carbon conversion factors are available

Greenhouse gas emissions factors - BEIS

DCFCarbonFactors_23_1_2015_17137.xls

Search in Sheet

Home Layout Tables Charts SmartArt Formulas Data Review

A1

- The market segment conversion factors related to the vehicle market segments specifically defined by SMMT (UK Society of Motor Manufacturers and Traders)
- Where a vehicle is used by an organisation but isn't owned by them, these vehicles can be reported in scope 3 instead of scope 1, using the same factors. (These factors can also be found in the 'land' or 'managed assets- vehicles').

Activity	Type	Unit	Diesel				Petrol			
			kg CO ₂ e	kg CO ₂	kg CH ₄	kg N ₂ O	kg CO ₂ e	kg CO ₂	kg CH ₄	kg N ₂ O
Cars (by size)	Small car	km	0.14701	0.14519	0.00005	0.00177	0.16061	0.15991	0.00014	
		miles	0.23659	0.233661	0.00008	0.002849	0.258477	0.25735	0.000225	
	Medium car	km	0.1772	0.17538	0.00005	0.00177	0.20088	0.20018	0.00014	
		miles	0.285176	0.282247	0.00008	0.002849	0.323285	0.322158	0.000225	
	Large car	km	0.23049	0.22867	0.00005	0.00177	0.29014	0.28944	0.00014	
		miles	0.370938	0.368009	0.00008	0.002849	0.466935	0.465809	0.000225	
	Average car	km	0.18546	0.18364	0.00005	0.00177	0.19388	0.19318	0.00014	
		miles	0.298469	0.29554	0.00008	0.002849	0.31202	0.310893	0.000225	

FAQs

Do the conversion factors take into account the age of vehicles?
 The conversion factors are based on information from the DfT (Department for Transport) who regularly analyse the mix of cars on the road in Britain through DVLA records and automatic number plate recognition. The conversion factors are updated each year to reflect changes in the spectrum of cars of different types and ages being driven.

I know the average mpg of my passenger vehicles as well as mileage; can this be used to improve my calculations?
 The mpg (miles per gallon) of the vehicle should be used to convert the distance travelled into litres of fuel used (refer to the 'conversions' listing to find values to assist this calculation). The conversion factors should then be applied, which will give a more accurate view of the actual emissions from the vehicle (the conversion factors for vehicle mileage represent the average mpg of the whole UK vehicle population; the vehicle's actual mpg and using this value will yield more precise results).

I know the average gCO₂/km of my passenger vehicles as well as mileage; can this be used to improve my calculations?
 If you know the manufacturer's gCO₂/km data this may be used as an alternative (and more precise) calculation for your passenger vehicle's emissions. The factors provided by manufacturers should be multiplied by the km distance travelled in the vehicle.

Where do I find out how these conversion factors were calculated?
 For information on the methodology and data sources used to derive the conversion factors presented here, please refer to the accompanying 'Methodology paper', which is available from the [GOV.UK website](#).

What's new Fuels Outside of scopes Refrigerant & other **Passenger vehicles** UK electricity Transmission and distribution



ICE Database

AutoSave Off ICE DB V3.0 - 10 Nov 2019.xlsx - Excel Ingeborg Steinbach

File Home Insert Page Layout Formulas Data Review View Help Search

Normal Page Break Preview Page Layout Custom Views Ruler Formula Bar Gridlines Headings Zoom 100% Zoom to Selection New Window Arrange All Freeze Panes Split Hide View Side by Side Synchronous Scrolling Reset Window Position Switch Windows Macros

D5

Materials	Embodied Carbon - kgCO2e/kg	Comments
General (Gypsum)	0.13	Problems selecting good value, inconsistent figures, West et al believe this is because of past aggregation of EE with cement
Plasterboard	0.39	See Ref [WRAP] for further info on GWP data, including disposal impacts which are significant for Plasterboard.
Plastics		
Version: ICE V 2.0 2011 [Note: Data for ICE V3 will be added soon]		
Materials	Embodied Carbon - kgCO2e/kg	Comments
General	3.31	35.6 MJ/kg Feedstock Energy (Included). Determined by the average use of each type of plastic used in the European construction industry.
ABS	3.76	48.6 MJ/kg Feedstock Energy (Included)
General Polyethylene	2.54	54.4 MJ/kg Feedstock Energy (Included). Based on average consumption of types of polyethylene in European construction
High Density Polyethylene (HDPE) Resin	1.93	54.3 MJ/kg Feedstock Energy (Included). Doesn't include the final fabrication.
HDPE Pipe	2.52	55.1 MJ/kg Feedstock Energy (Included)
Low Density Polyethylene (LDPE) Resin	2.08	51.6 MJ/kg Feedstock Energy (Included). Doesn't include the final fabrication
LDPE Film	2.60	55.2 MJ/kg Feedstock Energy (Included)
Nylon (Polyamide) 6 Polymer	9.14	38.6 MJ/kg Feedstock Energy (Included). Doesn't include final fabrication. Plastics Europe state that two thirds of nylon is used as fibres (textiles, carpets...etc) in Europe and that most of the remainder as injection mouldings. Dinitrogen monoxide and methane emissions are very significant contributors to GWP.
Nylon (polyamide) 6,6 Polymer	7.92	50.7 MJ/kg Feedstock Energy (Included). Doesn't include final fabrication (i.e. injection moulding). See comments for Nylon 6 polymer.
Polycarbonate	7.62	36.7 MJ/kg Feedstock Energy (Included). Doesn't include final fabrication.
Polypropylene, Orientated Film	3.43	55.7 MJ/kg Feedstock Energy (Included).
Polypropylene, Injection Moulding	4.49	54 MJ/kg Feedstock Energy (Included). If biomass benefits are included the CO2 may reduce to 3.85 kgCO2/kg, and GWP down to 4.41 kg CO2e/kg.
Expanded Polystyrene	3.29	46.2 MJ/kg Feedstock Energy (Included)
General Purpose Polystyrene	3.43	46.3 MJ/kg Feedstock Energy (Included)
High Impact Polystyrene	3.42	46.4 MJ/kg Feedstock Energy (Included)
Thermoformed Expanded Polystyrene	4.39	49.7 MJ/kg Feedstock Energy (Included)

ICE Summary >> Material Profiles >> Aggregates_Sand Aluminium Asphalt Bitumen

Ruler Formula Bar Gridlines Headings

Zoom 100% Zoom to Selection

New Window Arrange All Freeze Panes Split Hide Unhide View Side by Side Synchronous Scrolling Reset Window Position Switch Windows

I1

Category	Description	Units	Scope	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Comm
Weighting factors for tCO₂e emissions based on spend for eClass Carbon Profile (informal)											
Procurement eClass - Category A	Provisions	£	3	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Procurement eClass - Category B	Staff Clothing	£	3	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Procurement eClass - Category C	Patients Clothing & Footw	£	3	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Procurement eClass - Category D	Pharmaceuticals Blood Pr	£	3	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Procurement eClass - Category E	Dressings	£	3	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
Procurement eClass - Category F	Medical & Surgical Equipm	£	3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Procurement eClass - Category G	Patients Appliances	£	3	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
Procurement eClass - Category H	Chemicals & Reagents	£	3	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Procurement eClass - Category I	Dental & Optical Equipme	£	3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Procurement eClass - Category J	Diagnostic Imaging & Rad	£	3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Procurement eClass - Category K	Laboratory Equipment & S	£	3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Procurement eClass - Category L	Fuel Light Power Water	£	3								
Procurement eClass - Category M	Hotel Services Equipment	£	3	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Procurement eClass - Category P	Building & Engineering Pr	£	3	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Procurement eClass - Category R	Purchased Healthcare	£	3	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Procurement eClass - Category S	Gardening & Farming	£	3	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68
Procurement eClass - Category T	Furniture Fittings	£	3	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Procurement eClass - Category U	Hardware Crockery	£	3	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
Procurement eClass - Category V	Bedding Linen & Textiles	£	3	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Procurement eClass - Category W	Office Equipment Telecon	£	3	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Procurement eClass - Category X	Transportation	£	3								
Procurement eClass - Category Y	Recreational Equipment &	£	3	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Procurement eClass - Category Z	Staff & Patient Consulting	£	3	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31

Carbon by units of healthcare activity



Care Pathways Guidance on Appraising Sustainability (SDU, 2015)



SDU (2015). <https://www.sduhealth.org.uk/areas-of-focus/carbon-hotspots/pharmaceuticals/cspm/sustainable-care-pathways-guidance.aspx>

Steps involved

1. Define the goal and scope of the study
2. Identify the resources used
(set boundaries, create inventory)
 - 2.1 Identify what data is available
 - 2.2 Check what carbon conversion factors are available
3. Measure the resource utilisation
(collect data)

Measure resource utilisation

- Electricity & gas: kWh
- Travel: mode of transport, km/miles travelled
- Medical equipment: £
- Pharmaceuticals: £
- Anaesthetic gases: number of bottles
- Waste: tonnes
- Materials: kg

Availability of data

Electricity use in the operating theatre (OT):

Electricity use of the whole hospital (kWh)

Square metres of the whole hospital

⇒ **electricity use per square metre (kWh/m²)**

Electricity use of OT 3-6 times of hospital = average 4.5

⇒ **electricity use per square metre OT (kWh/OTm²)**

Multiply by square metres of OT

= > **electricity use of OT**

Steps involved

1. Define the goal and scope of the study
2. Identify the resources used
3. Measure the resource utilisation (collect data)
4. Attribute a carbon cost or carbon emissions factor to the resources used

Carbon footprint (kg CO₂e) =

Activity/resource use x GHG emissions factors

Scenario

Over the past six months Tom has been dispensed 3x Ventolin and 3x corticosteroid inhalers.

His asthma is poorly controlled and over 6 months Tom attends the emergency department 3 times (including 2 ambulance call-outs), spends 2 days in hospital and has 5 GP appointments (in addition to his annual asthma nurse review). He usually walks to the surgery as the practice is only 10 minutes from home.

Task

1. Calculate the carbon footprint of Tom's inhaler use over the six month period.
2. Compare with the number of km driven in an average sized petrol car.
3. Calculate the carbon footprint of Tom's unplanned care (due to his poor asthma control).

Carbon footprint of Tom's inhaler use

GHG emissions factors

Ventolin: 29 kgCO₂e/inhaler

Corticosteroid inhaler: 20 kgCO₂e/inhaler

Calculation

Carbon footprint = 3 x Ventolin + 3 x corticosteroid inhaler

Carbon footprint = (3 x 29 kgCO₂e) + (3 x 20 kgCO₂e) = **147 kgCO₂e**

Compare with number of km driven in an average sized petrol car

GHG emissions factors

Optimal treatment: 147 kgCO₂e/6 months

Car: 0.22233 kgCO₂e/km

Calculation

Distance (km) = $147/0.22233 = 661.2\text{km}$

(Land's End to John O'Groats = 936km)

Carbon footprint of Tom's unplanned care

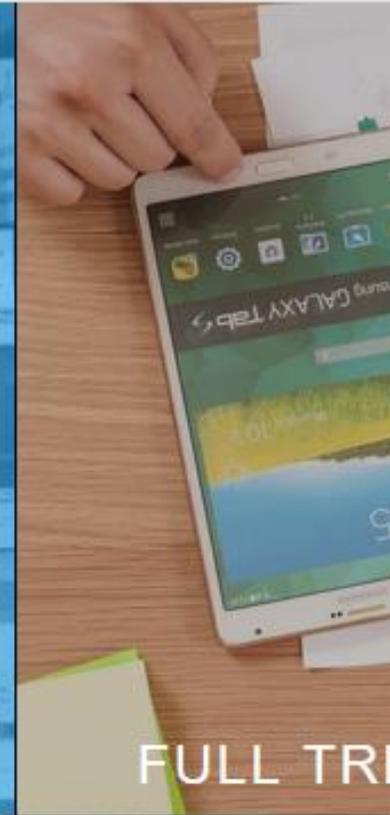
GHG emissions factors

Ambulance journey:	36.1 kgCO ₂ e / single trip
Self travel to hospital:	2.9 kgCO ₂ e /single trip
ED visit:	13.8 kgCO ₂ e / visit
Inpatient bed day:	37.9 kgCO ₂ e / bed day
GP appointment:	6 kgCO ₂ e/ visit

Calculation

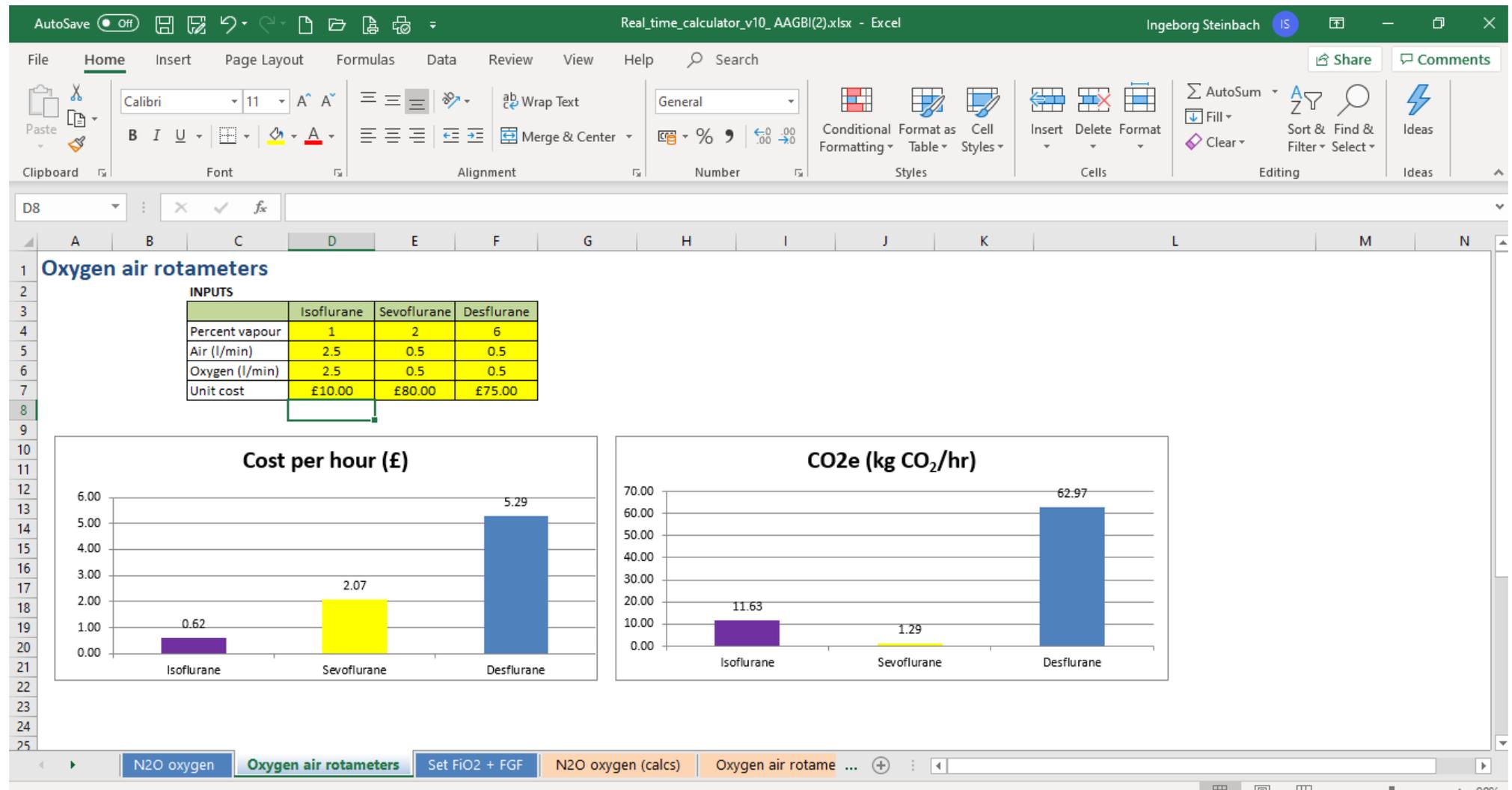
Carbon footprint = 2 x journey by ambulance + 1 private travel to hospital + 3 x ED visit+ 2 x inpatient bed days + 3 x private travel home + 5 x GP appointment

Carbon footprint = (2 x 36.1 kgCO₂e) + (1 x 2.9 kgCO₂e) + (3 x 13.8 kgCO₂e) + (2 x 37.9 kgCO₂e) + (3 x 2.9 kgCO₂e) + (5 x 6kgCO₂e) = **231 kgCO₂e**



Anaesthetic gases calculator

<https://anaesthetists.org/Home/Resources-publications/Environment/Guide-to-green-anaesthesia/Anaesthetic-gases-calculator>



Thank you!

ingeborg.steinbach@sustainablehealthcare.org.uk



CENTRE *for*
SUSTAINABLE
HEALTHCARE
inspire • empower • transform

Resources for next steps

Ingeborg Steinbach

Carbon Modelling Lead, Centre for Sustainable Healthcare, Oxford, UK

@SusHealthcare

Q Visit, Oxford, 11 March 2020



Resources for next steps

SusQI:

- Intro & resources: <https://sustainablehealthcare.org.uk/susqi>
- Green Ward Competition / SusQI in Trusts
- SusQI Education – opportunity to pilot

Networks:

- Q Special Interest Group
- CSH Networks, , <https://networks.sustainablehealthcare.org.uk/networks>
- SDU regional sustainability networks,
<https://www.sduhealth.org.uk/delivery/engage/regional-and-local-networks.aspx>

Resources for next steps

Case studies:

- Case studies, <https://map.sustainablehealthcare.org.uk/projects>
- Case studies, <https://www.england.nhs.uk/greenernhs/whats-already-happening/>
- Case studies, <https://www.sduhealth.org.uk/resources/case-studies.aspx>

CSH Sustainability School – 1-day courses

NHS Forest – <https://nhsforest.org>



Special Interest Group

Sustainable Healthcare



[Leave Group](#)
[All groups !\[\]\(7fd65f65fc0b6791cf7fbd42ae8069a8_img.jpg\)](#)

Add an update

About this group

Sustainability should be considered a domain of

networks.sustainablehealthcare.org.uk

Sign up | Log in

CSH Networks

HOME NETWORKS EVENTS RESOURCES

- Jump to a network - This network Visit the CSH main site

Green Nephrology



Bringing together patients, clinicians, renal technicians and others to share ideas for [sustainable kidney care](#).

Register or log in to join our networks!

Share this page

Twitter LinkedIn Facebook Google+

ALL 202 FEATURED 31 RESOURCES 53 POSTS 148 Q & A 1 WIKIS 0 POLLS 0

Upcoming events

14th International People Plant Symposium
Oct 11 to 13 2018, 9:00am - 9:00am
0 attendees, 0 comments [more](#)

Organisers



New examples from kidney units needed!

Post created 16 days ago in the [Green Nephrology](#) network by [Frances Mortimer](#)

<http://networks.sustainablehealthcare.org.uk>

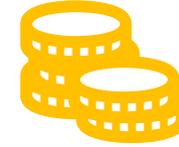
Thank you!

<http://sustainablehealthcare.org.uk/susqi>

info@sustainablehealthcare.org.uk

[@SusHealthcare](#) [#SusQI](#)





Is Sustainable Healthcare Possible?

Dr. Olivia Bush MBBS, BSc, MRCP

Centre for Sustainable Healthcare

Q Visit

11th March 2020

The NHS produces 5.4% of the UK's greenhouse gases. How can hospitals cut their emissions?

Switching anaesthetic gases, using electric ambulances and 'greening' dialysis are reducing the NHS's carbon footprint



▲ 'Newcastle hospitals trust recycles packaging and used dialysis fluid canisters, while energy-saving measures include the retrofitting of heat recovery technology within dialysis machines.' Photograph: Newcastle upon Tyne Hospitals NHS Foundation Trust

The NHS produces 5.4% of the UK's greenhouse gases. How can hospitals cut their emissions?

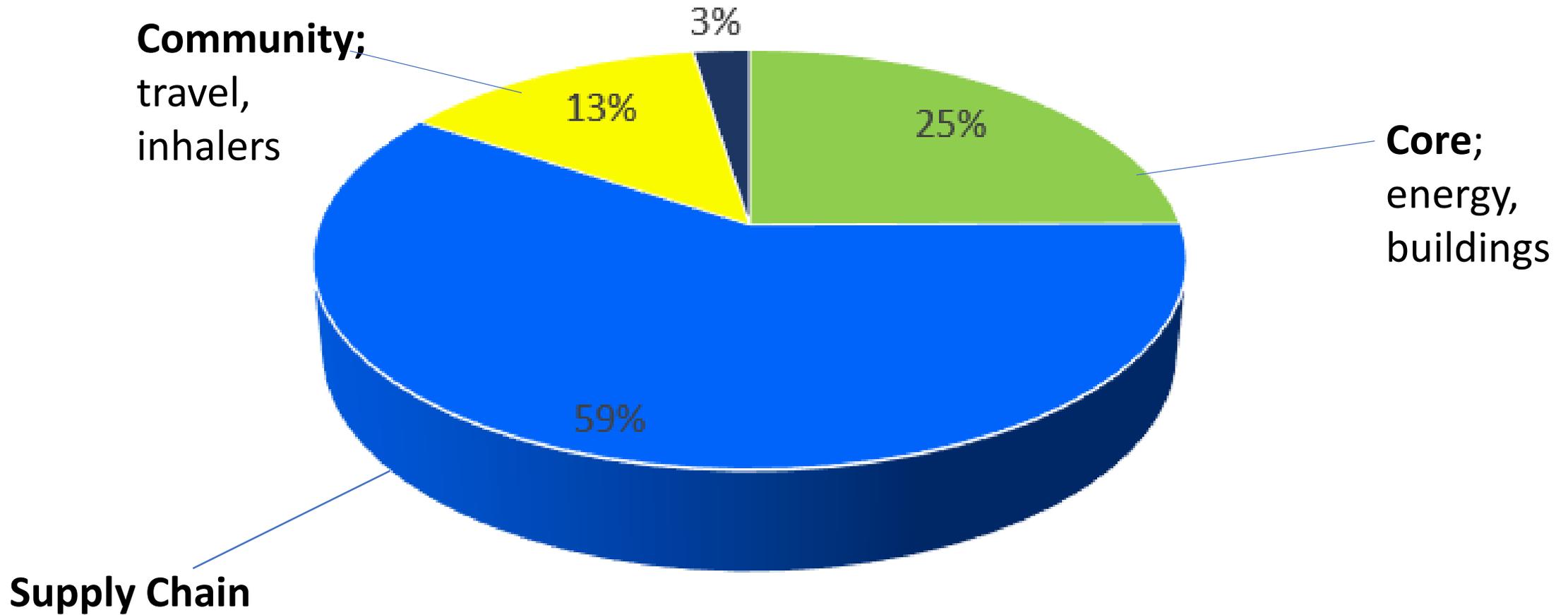
Whole System

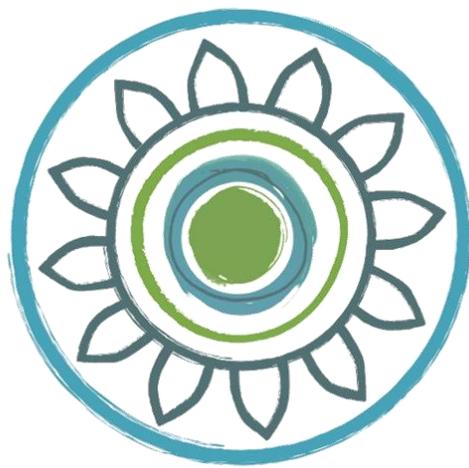
Switching anaesthetic gases, using electric ambulances and 'greening' dialysis are reducing the NHS's carbon footprint



▲ 'Newcastle hospitals trust recycles packaging and used dialysis fluid canisters, while energy-saving measures include the retrofitting of heat recovery technology within dialysis machines.' Photograph: Newcastle upon Tyne Hospitals NHS Foundation Trust

Carbon Footprint of NHS England – 21.54 MtCO₂e





GREEN WARD COMPETITION

CENTRE FOR SUSTAINABLE HEALTHCARE

Royal Cornwall Hospitals 
NHS Trust

Royal Devon and Exeter 
NHS Foundation Trust


The Royal Bournemouth
and Christchurch Hospitals
NHS Foundation Trust

University Hospital Southampton 
NHS Foundation Trust

Dartford and Gravesham 
NHS Trust

University College London Hospitals 
NHS Foundation Trust

Frimley Health 
NHS Foundation Trust

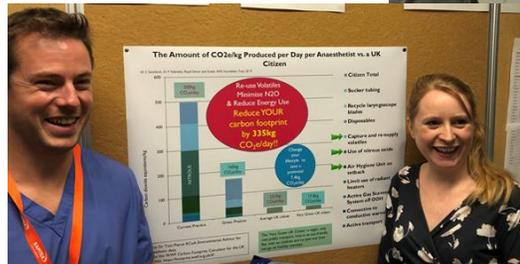

Barts Health
NHS Trust

Ashford and St. Peter's Hospitals 
NHS Foundation Trust


Sussex Community
NHS Foundation Trust


Whittington Health
NHS Trust


The Leeds
Teaching Hospitals
NHS Trust



CENTRE for
SUSTAINABLE
HEALTHCARE



Learning Objectives

- To define **sustainable healthcare**

Learning Objectives

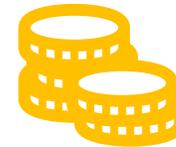
- To define **sustainable healthcare**
- Come up with project ideas that are:

Learning Objectives

- To define **sustainable healthcare**
- Come up with project ideas that are:
 - Focussed on **clinical care** 

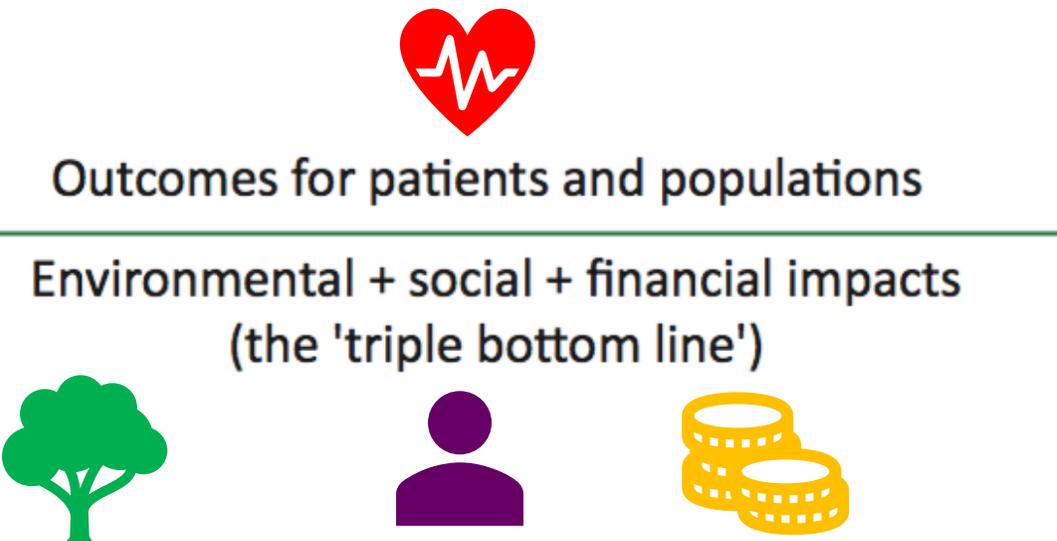
Learning Objectives

- To define **sustainable healthcare**
- Come up with project ideas that are:
 - Focussed on **clinical care** 
 - Address the **'triple bottom line'** (environmental, social & financial)



Aim of Sustainable QI:

“to deliver care in a way that maximises positive health outcomes and avoids both financial waste and harmful environmental impacts, while adding social value at every opportunity.”

$$\text{Value} = \frac{\text{Outcomes for patients and populations}}{\text{Environmental + social + financial impacts (the 'triple bottom line')}}$$


Carbon Footprint of NHS England – 21.54 MtCO₂e

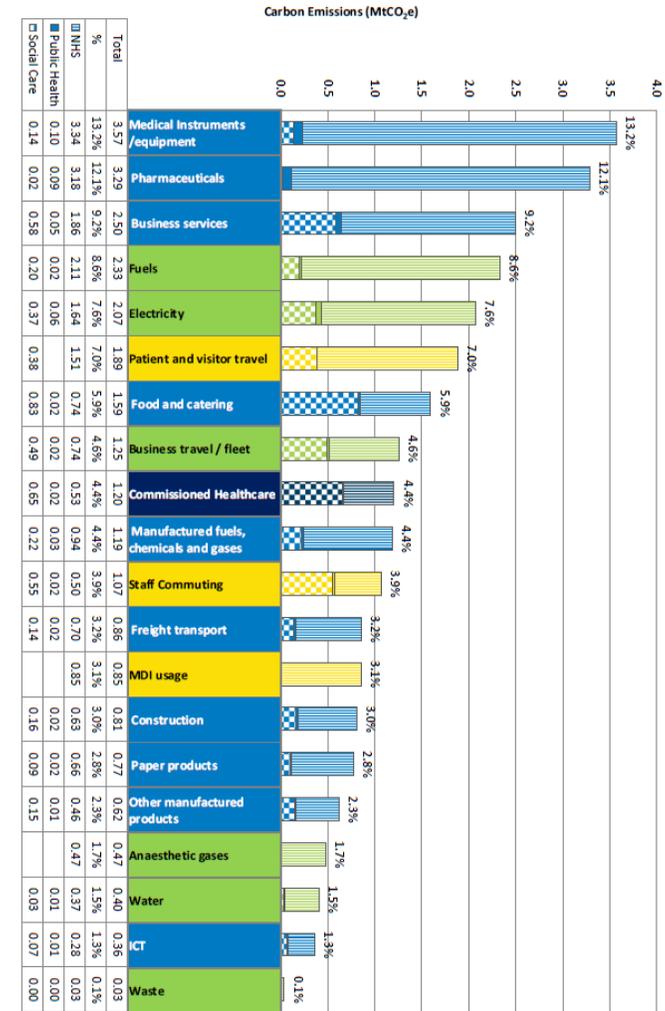
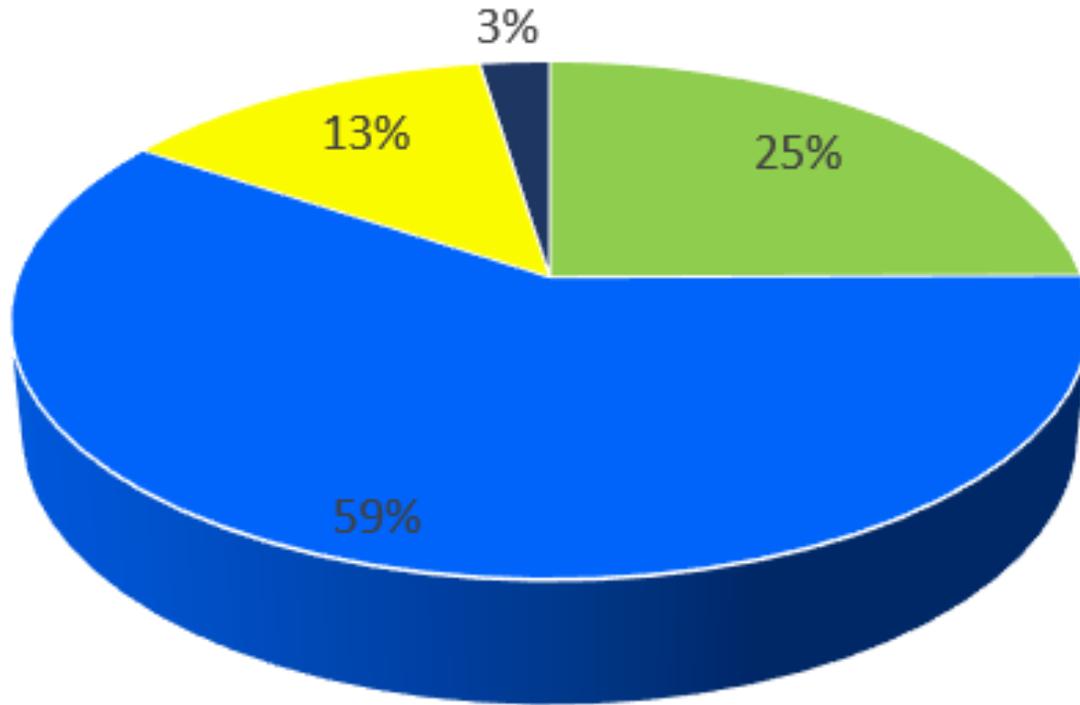




Figure 2. Clinical resources, tasks and processes

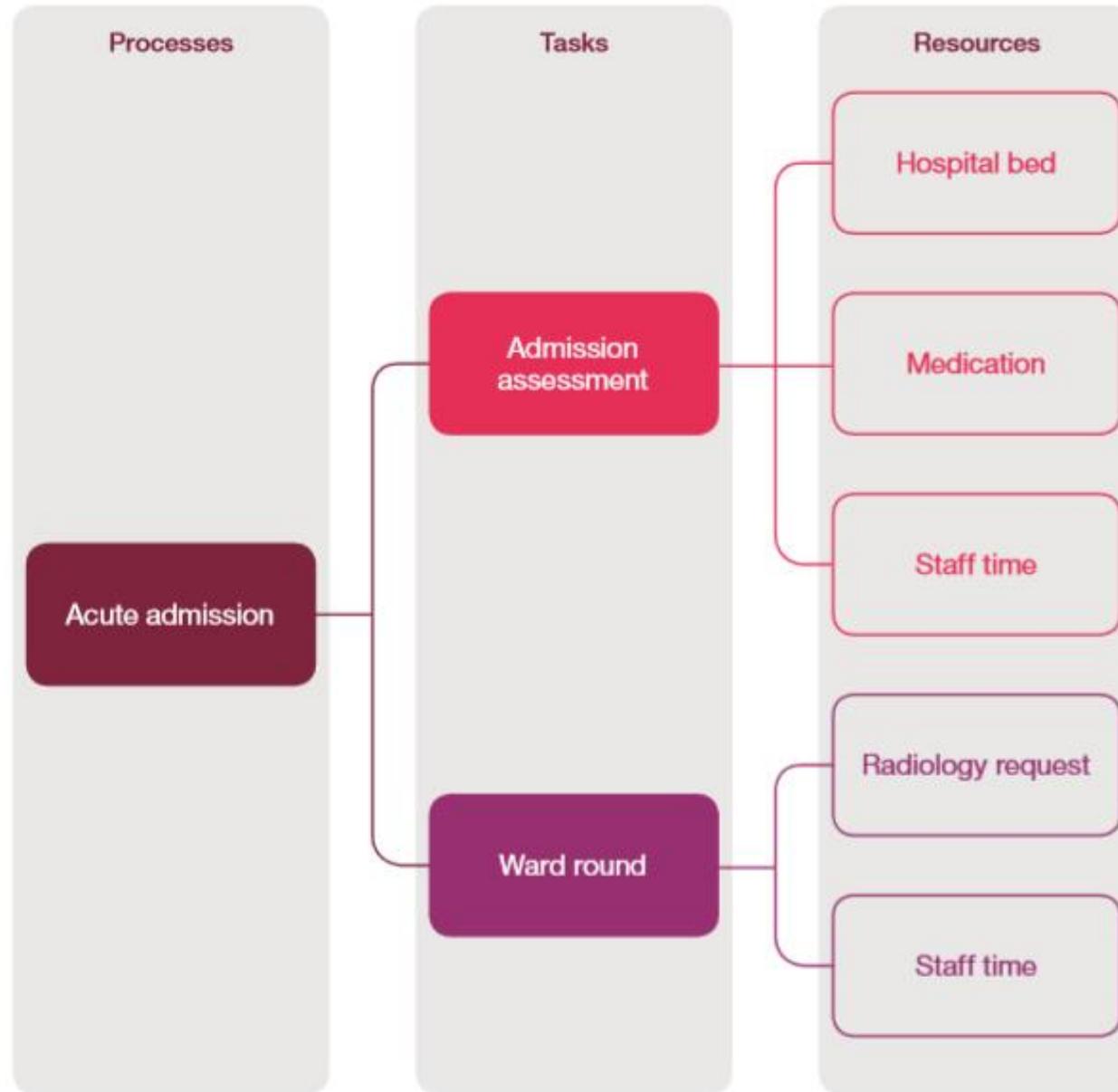
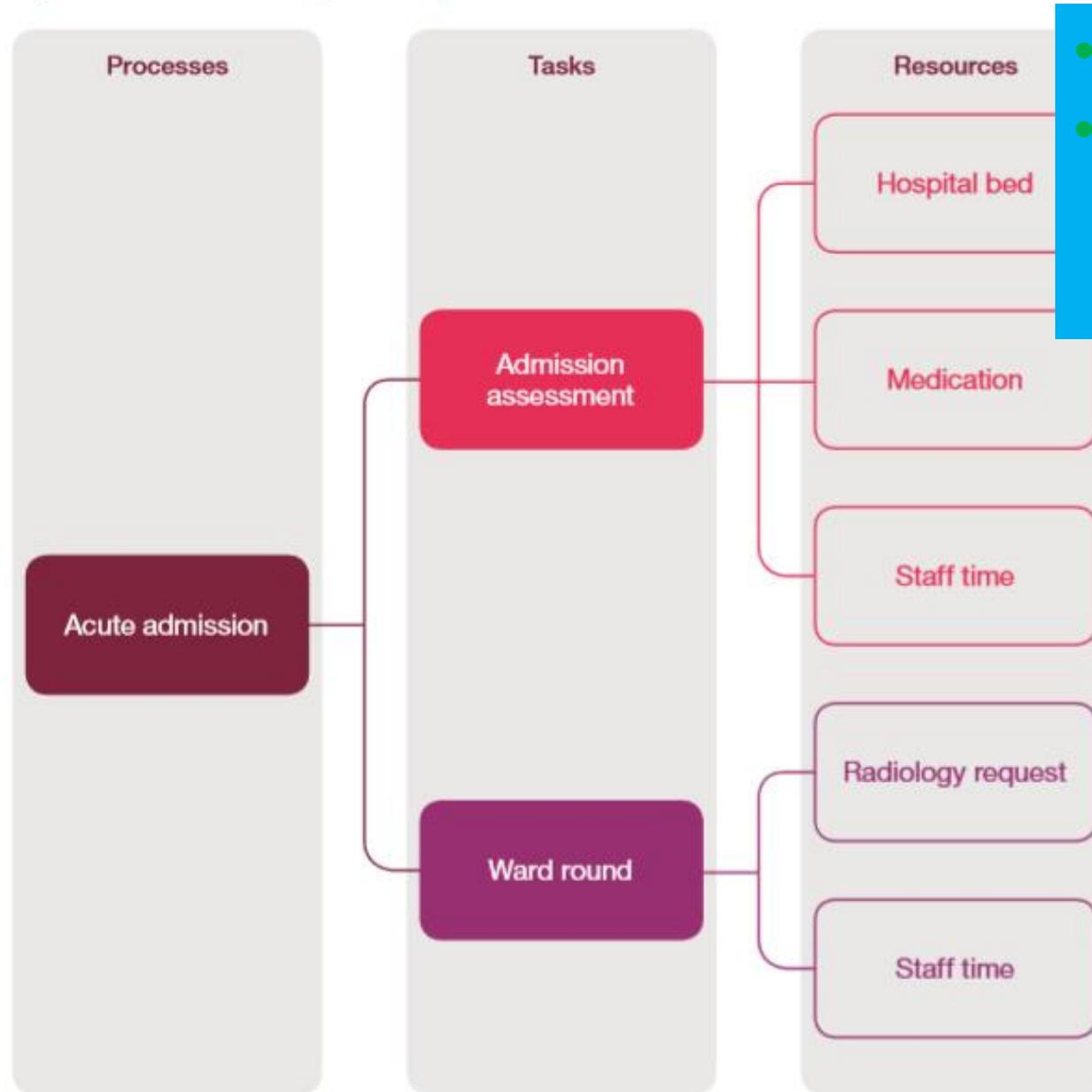


Figure 2. Clinical resources, tasks and processes



- ED
- Anaesthetic gases

Figure 2. Clinical resources, tasks and processes

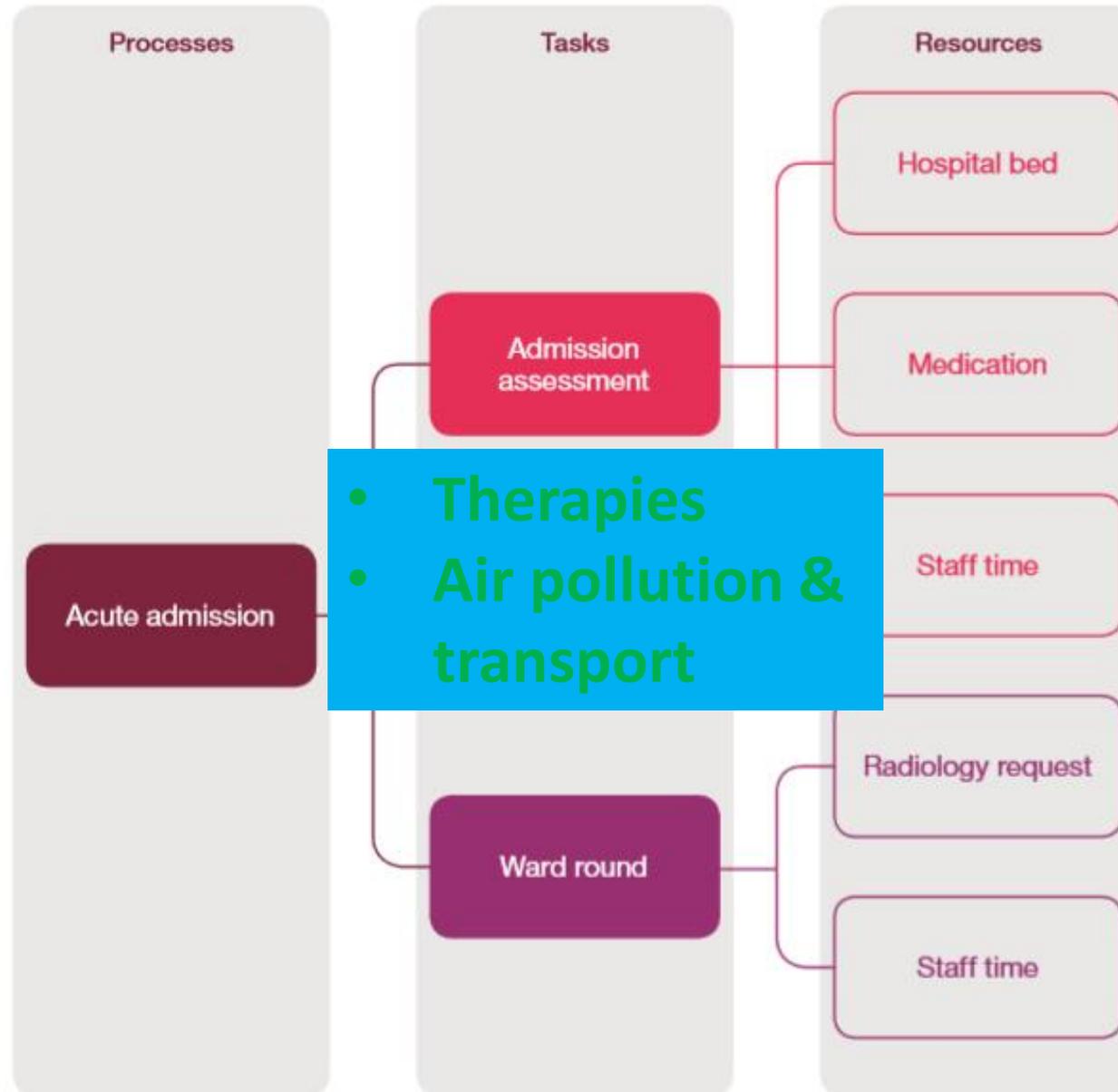
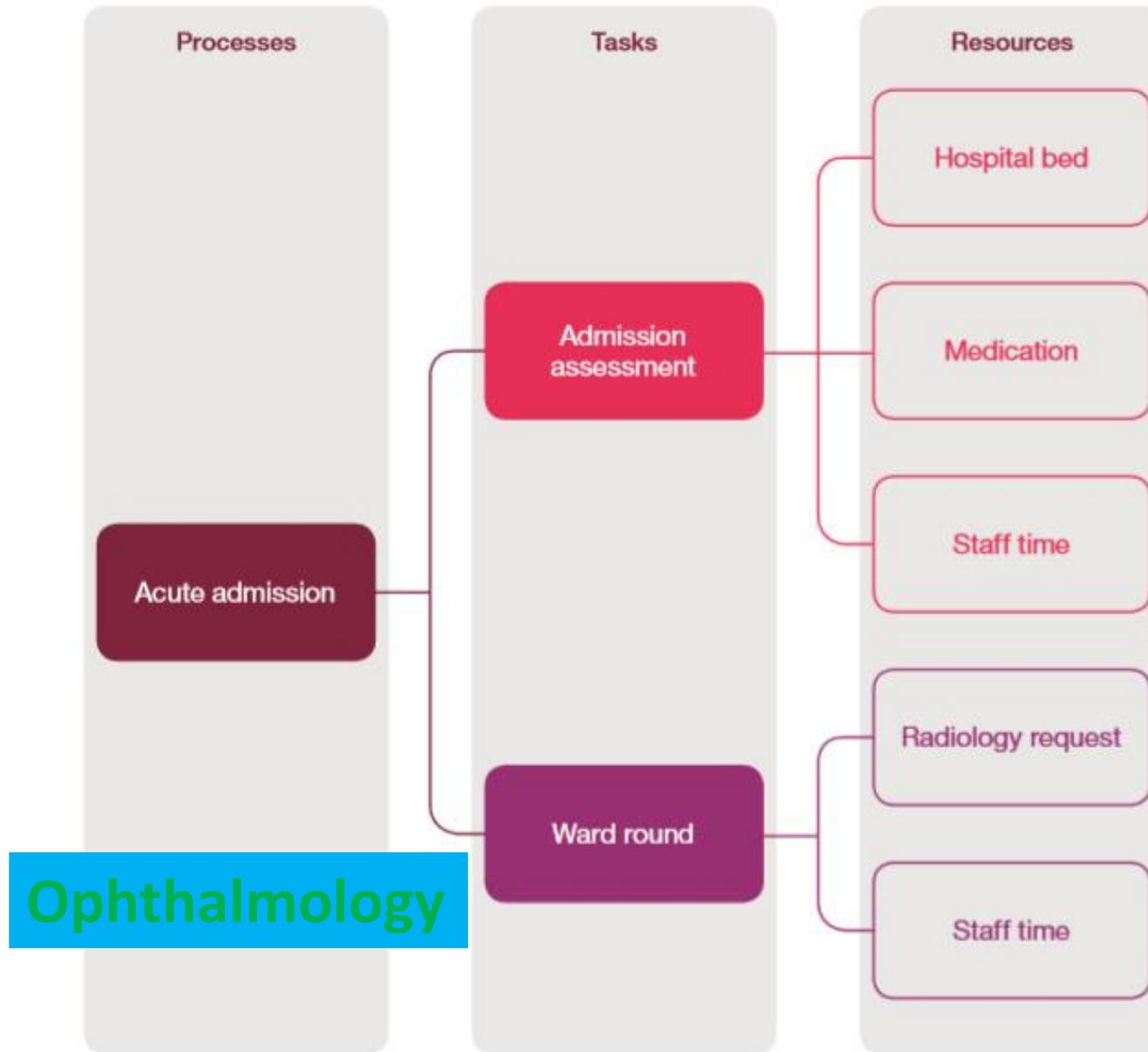


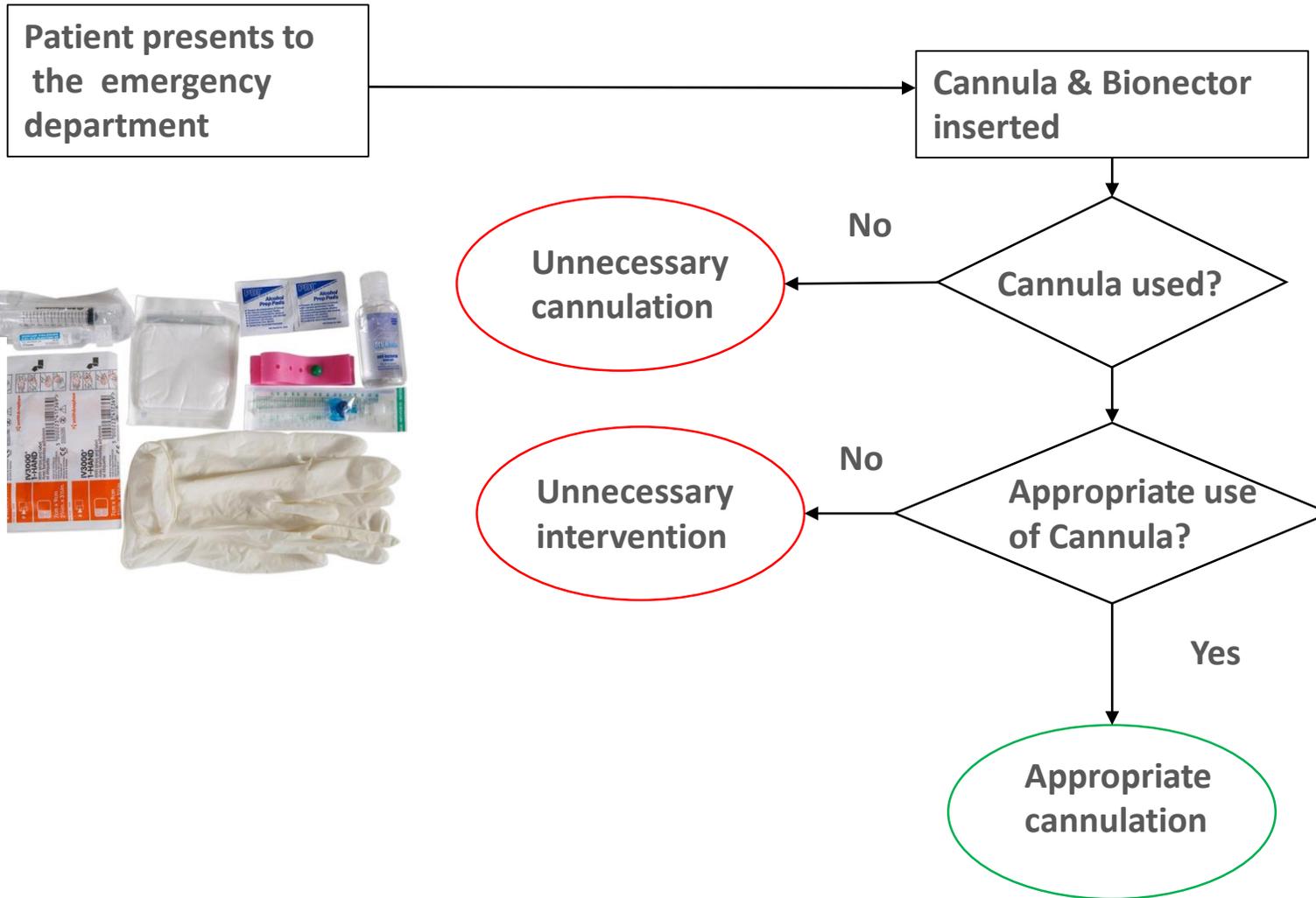
Figure 2. Clinical resources, tasks and processes



Reducing unnecessary cannulation in ED



Reducing unnecessary cannulation in ED



Reducing unnecessary cannulation in ED

59%
reduction

Patient presents to
the emergency
department

Cannula & Bionector
inserted

No

Unnecessary
cannulation

Cannula used?

No

Unnecessary
intervention

Appropriate use
of Cannula?

Yes

Appropriate
cannulation



Reducing unnecessary cannulation in ED

59%
reduction

Patient presents to
the emergency
department

Cannula & Bionector
inserted

66%
reduction

Unnecessary
cannulation

Cannula used?

Unnecessary
intervention

No

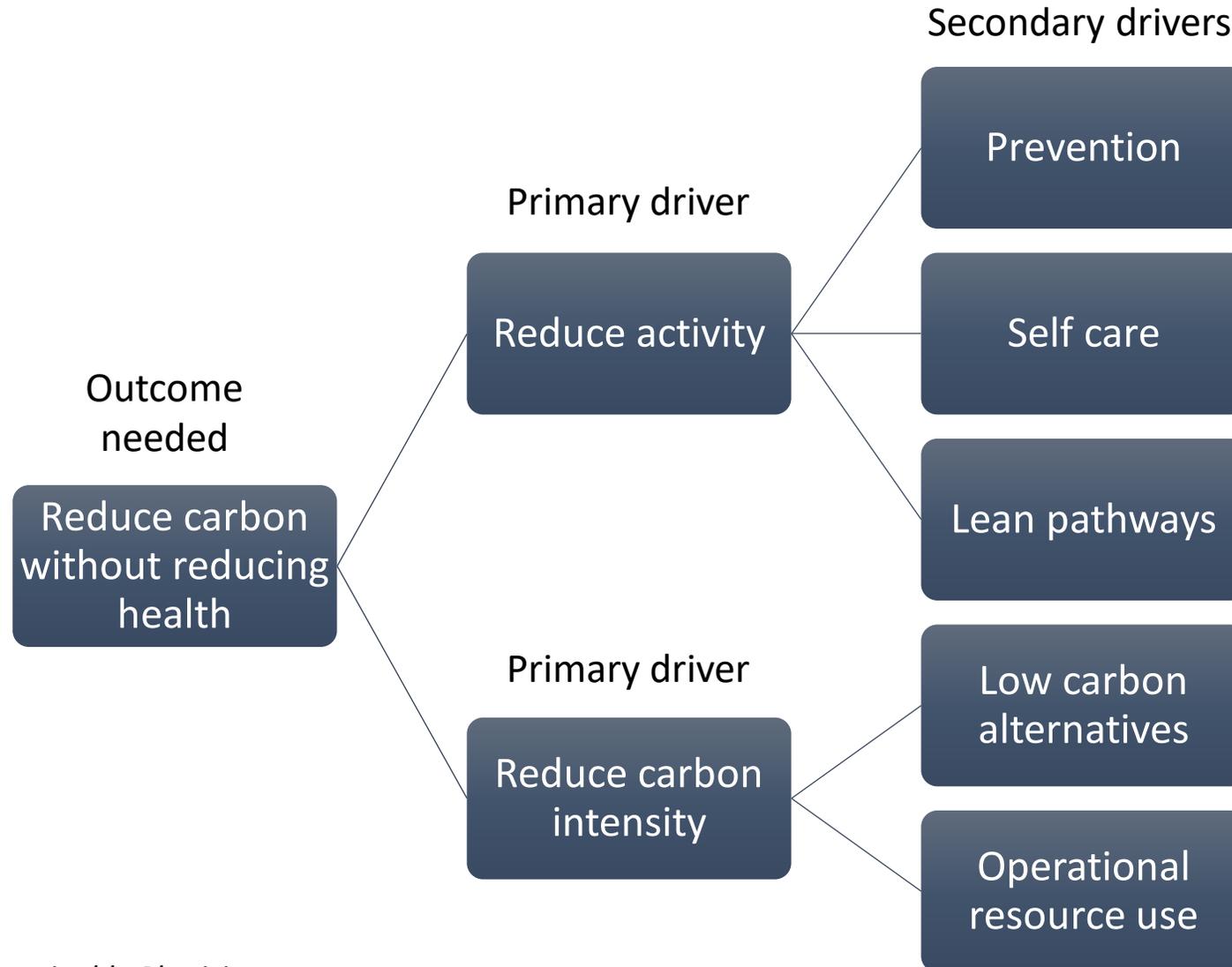
Appropriate use
of Cannula?

Yes

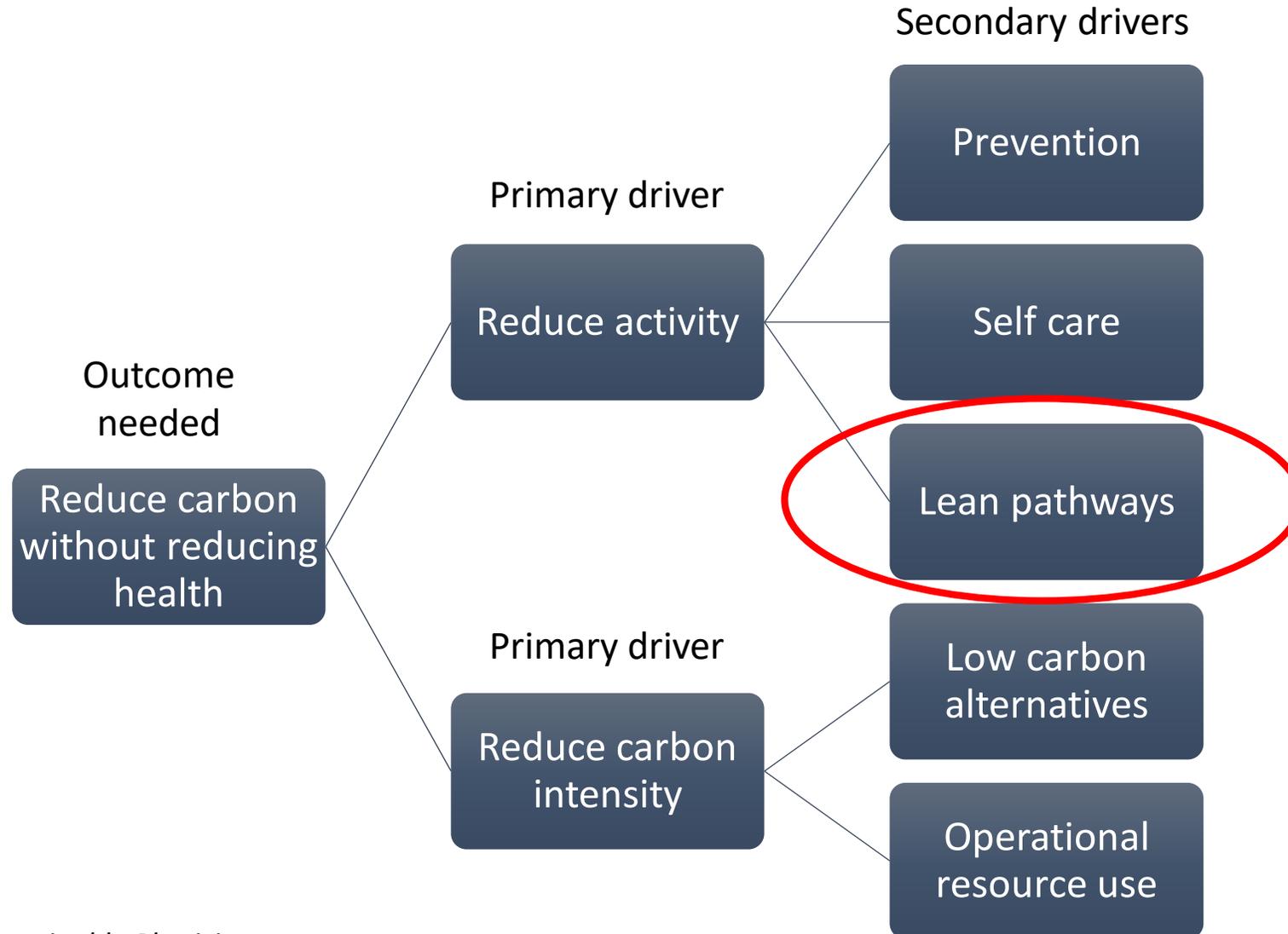
Appropriate
cannulation



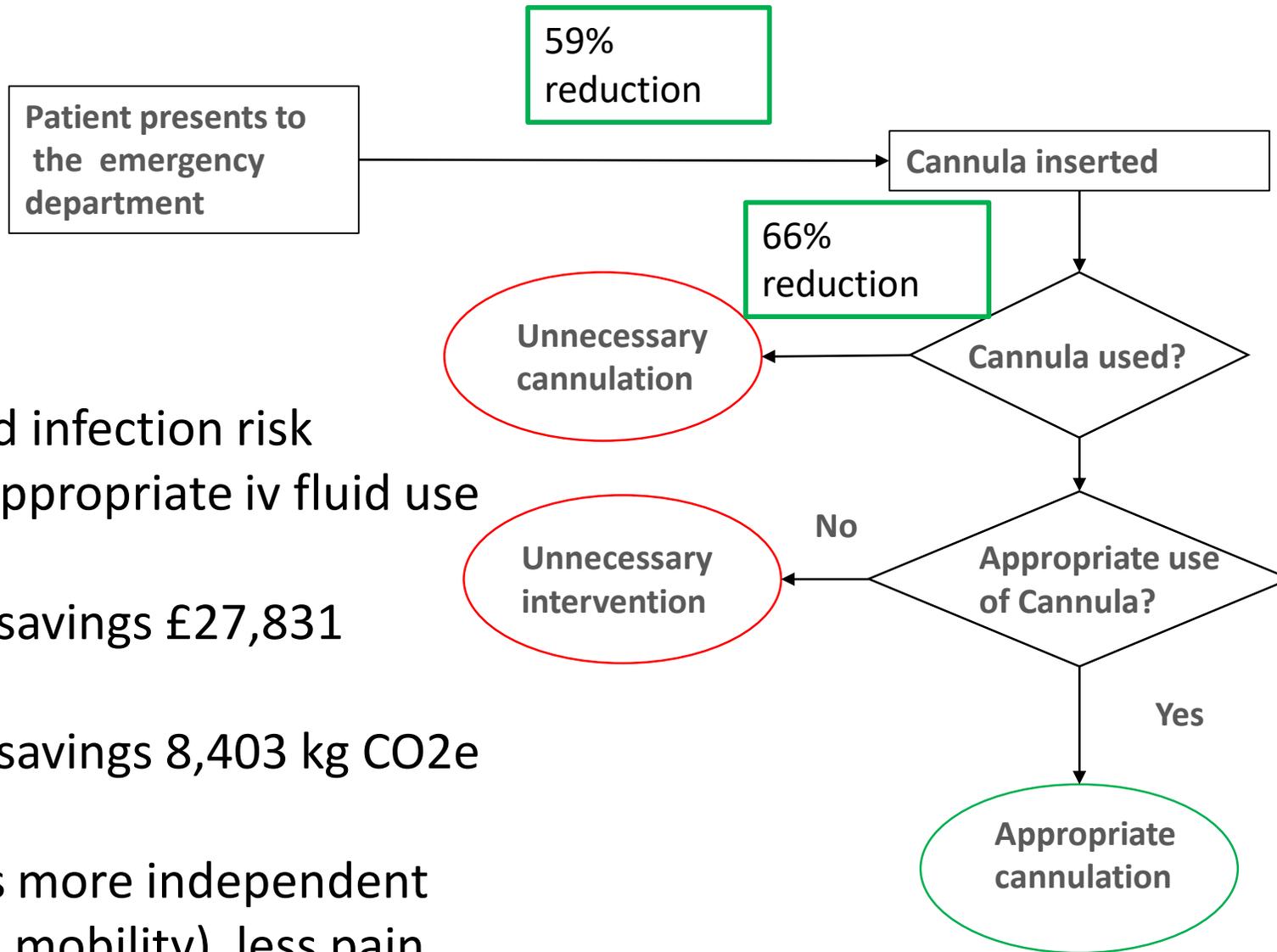
Sustainable clinical practice: principles



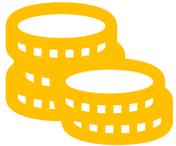
Sustainable clinical practice: principles



Reducing unnecessary cannulation in ED



Reduced infection risk
Less inappropriate iv fluid use



Annual savings £27,831



Annual savings 8,403 kg CO2e

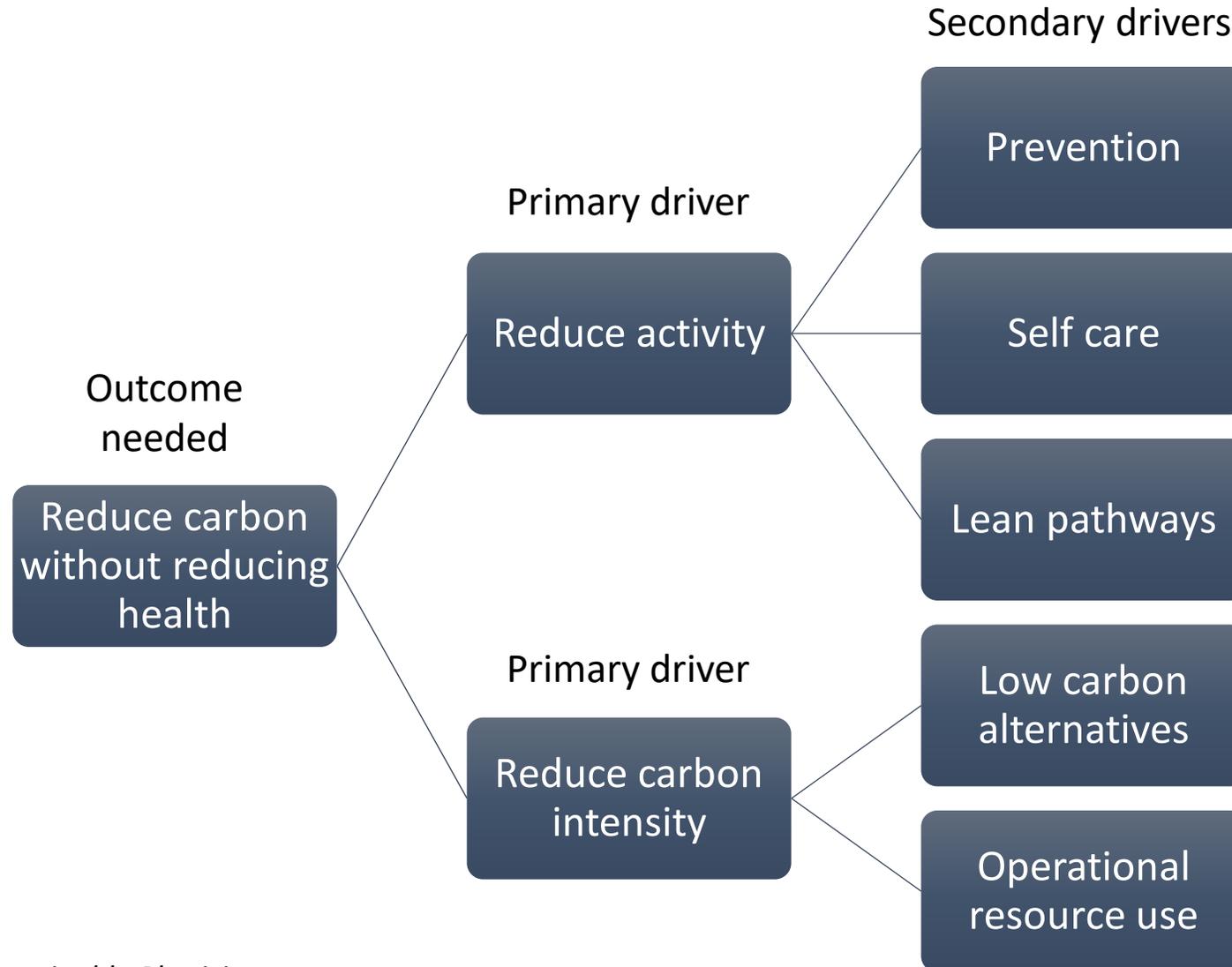


Patients more independent
(ADLs & mobility), less pain

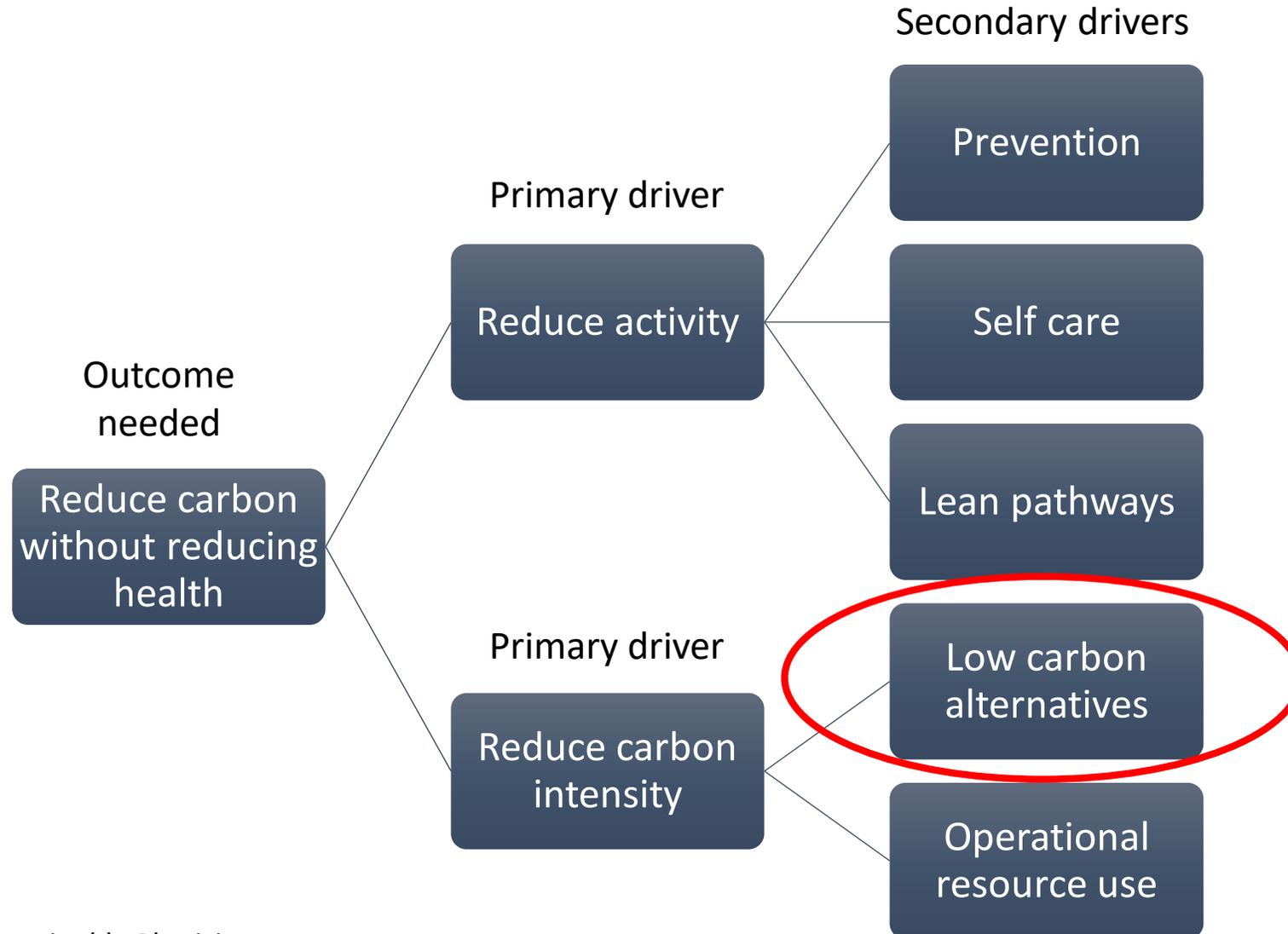
Reducing the use of nitrous oxide



Sustainable clinical practice: principles



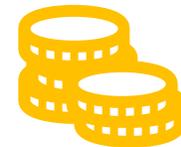
Sustainable clinical practice: principles



Reducing the use of nitrous oxide



Fewer side effects for patient
Reduced risk of abuse in community
Reduce miscarriage risk for staff



ANNUAL SAVINGS FORECAST

 **70,714 litres nitrous oxide**
 **49,906 kgCO2e**
 **£529**

(not taking into account the potential savings of maintenance and manpower required)

TIVA training

“Discussion and presentations within the anaesthetic department on the contribution of nitrous oxide and volatiles to global warming prompted me to look again at the figures.

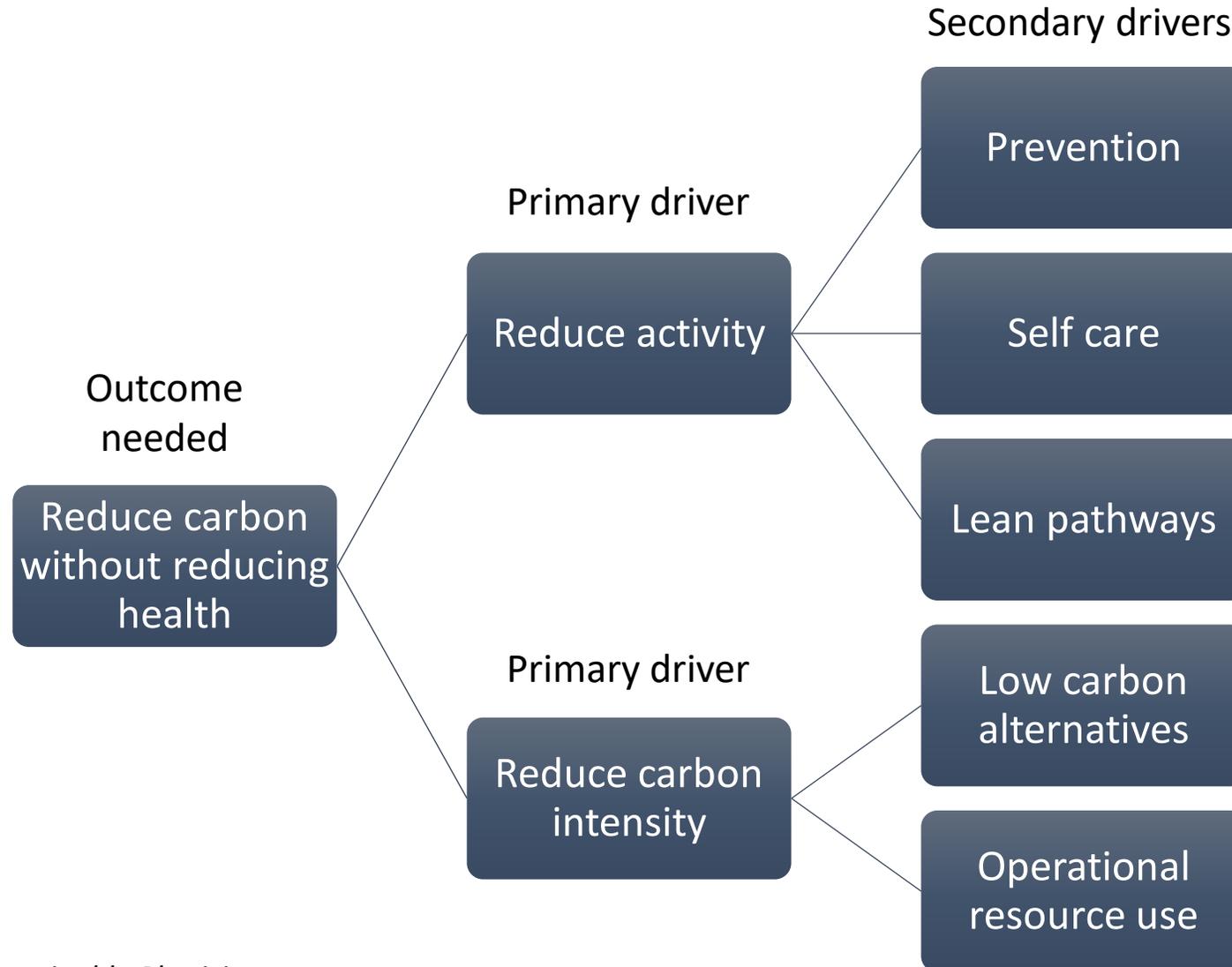
Nitrous oxide [in] anaesthetics... is a huge contribution to my own carbon footprint on the occasions that I use it. Since I can easily avoid it, I am happy to stop using nitrous oxide entirely.”

Dr R Price, Consultant Anaesthetist

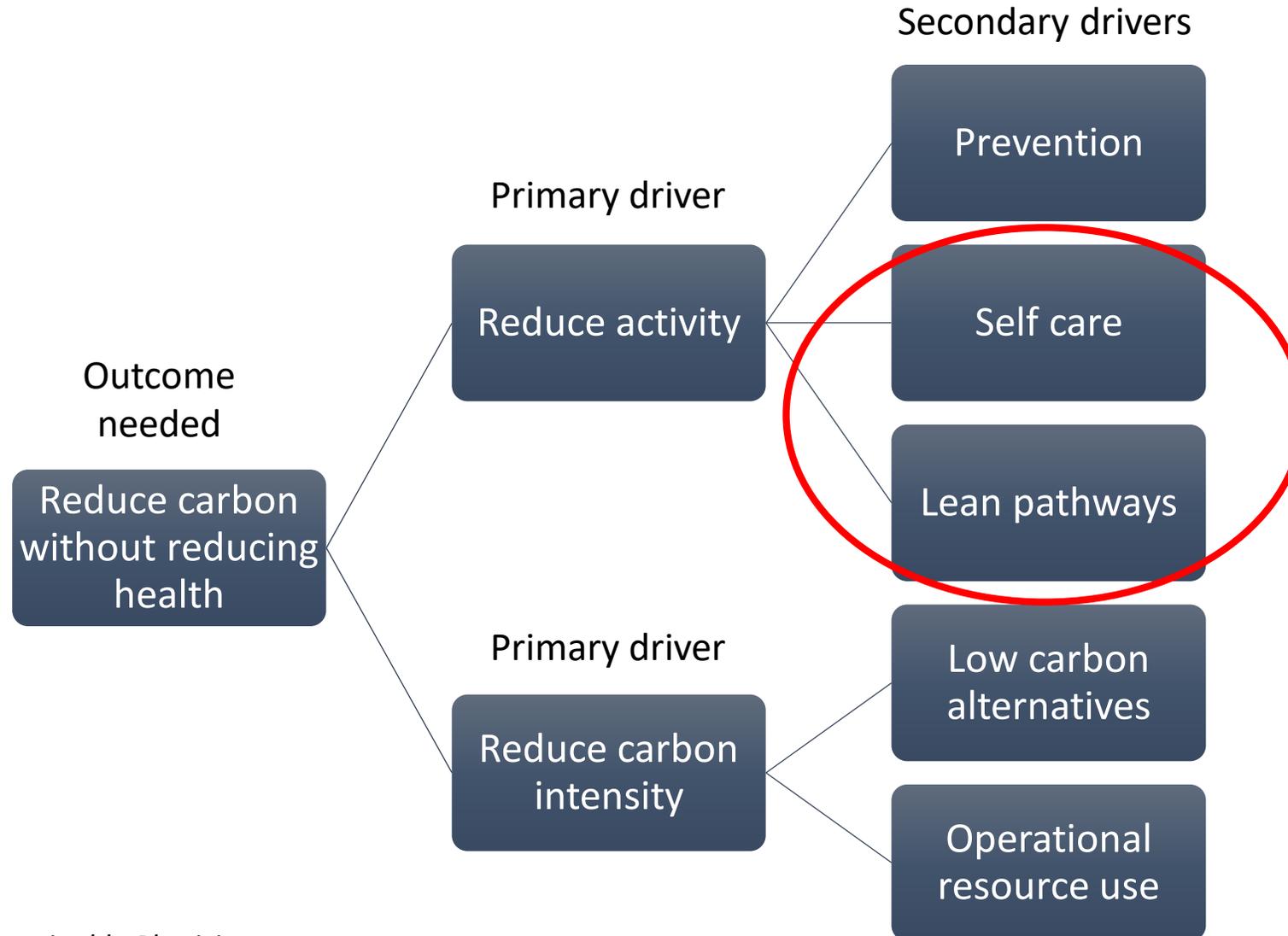
Pioneering Early Mobilisation in Southampton Cardiac Intensive Care (CICU) unit



Sustainable clinical practice: principles



Sustainable clinical practice: principles

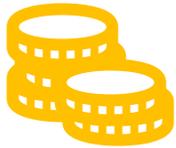


Pioneering Early Mobilisation in Southampton Cardiac Intensive Care (CICU) unit



Clinical Outcomes:

- Reduced ventilation days by 4 days
- Reduced overall cardiac intensive care stay by 6 days



Financial:

- Total savings of £1,266,327 over 2 years



Environmental:

- Total savings of 48.5 tonnes CO2e over 2 years



Social:

- More rapid recovery, quicker discharge and return to ADLs
- Patients having more autonomy during their hospital stay
- Increased staff satisfaction



NHS

IN HEALTH

NHS

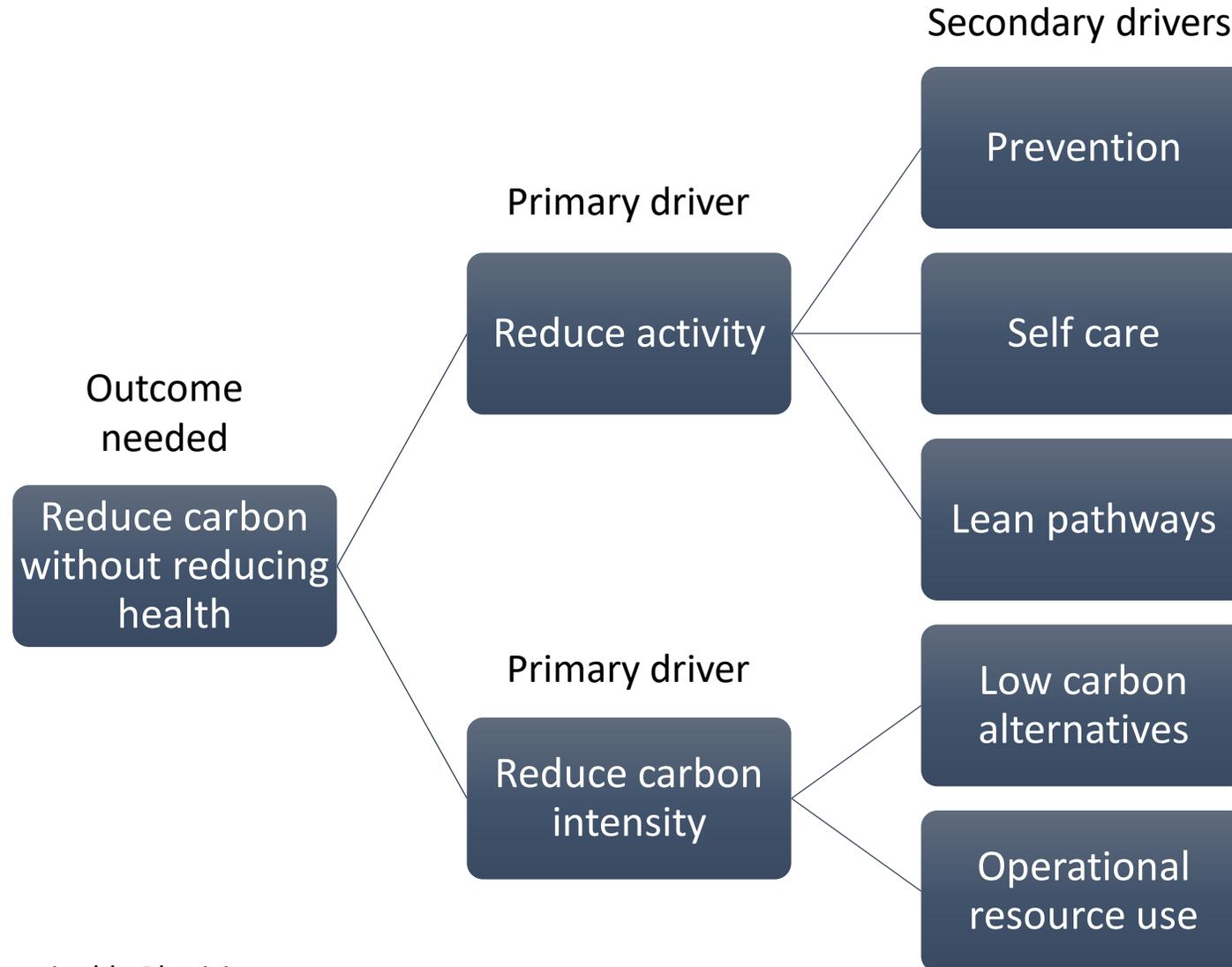
Frimley Health
NHS Foundation Trust

Improving Health

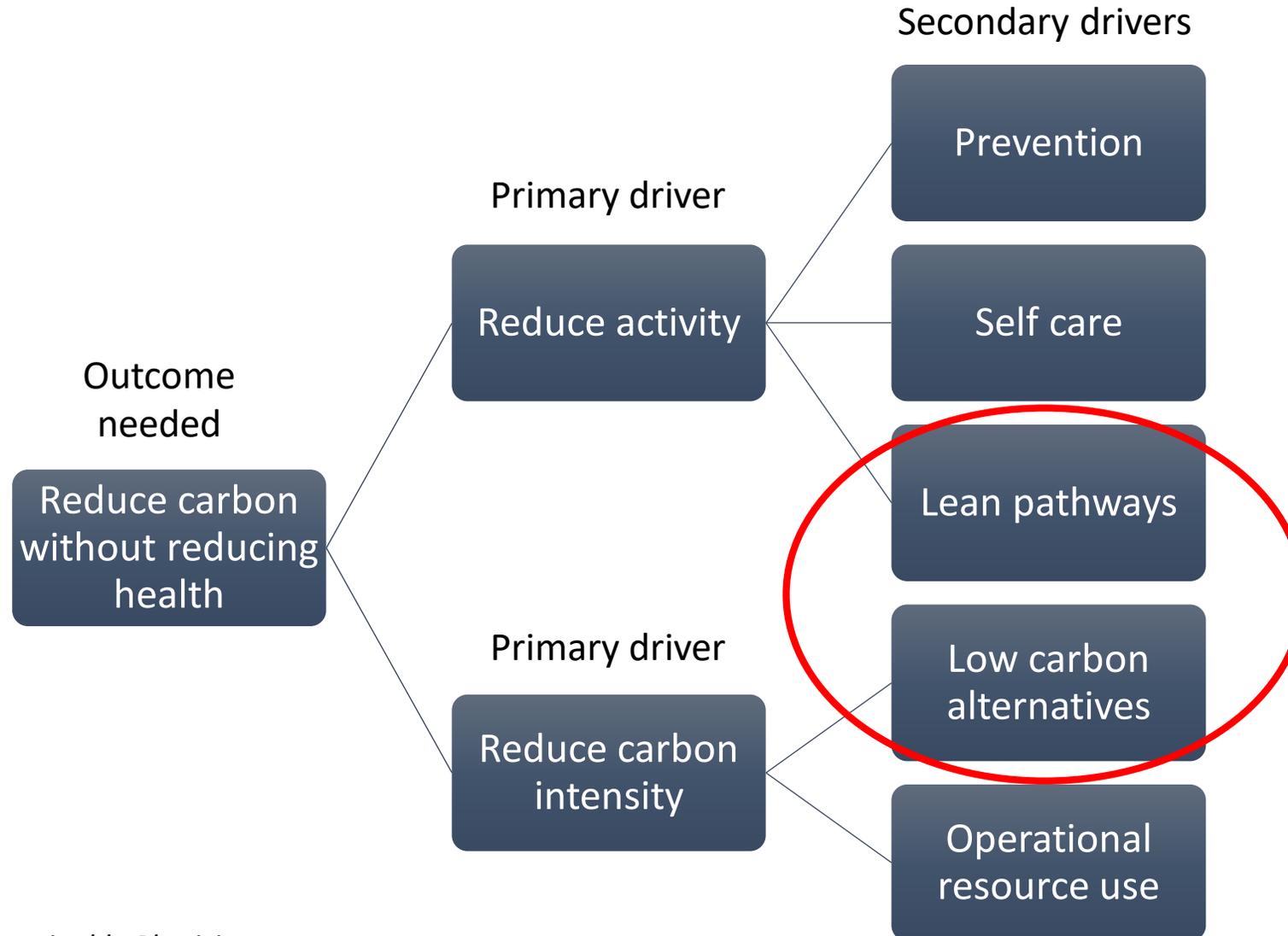
Frimley Health NHS

10

Sustainable clinical practice: principles



Sustainable clinical practice: principles

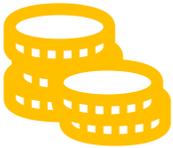


Stroke Early Discharge Community Service; Reducing Air Pollution & Emissions



Clinical Outcomes:

- None measured; if adopted at scale could impact health due to reduced air pollution.



Financial:

- £216/year



Environmental:

- 4,380kgCO₂e/year
- If adopted at scale could reduce air pollution



Social:

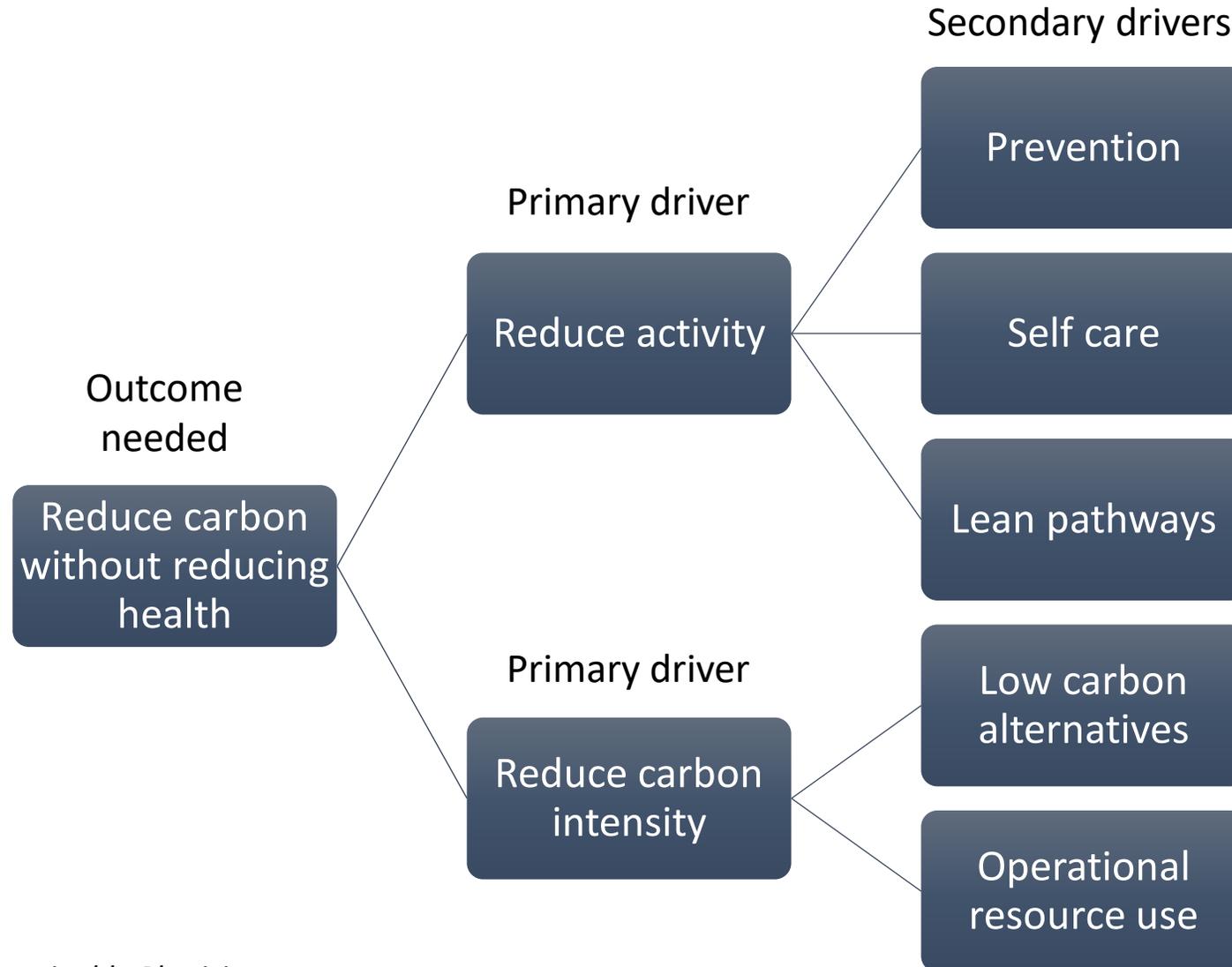
- Reduce wear & tear on staff own cars (grey fleet)
- Staff pleased to be 'eco friendly'

Unnecessary delays in cataract surgery

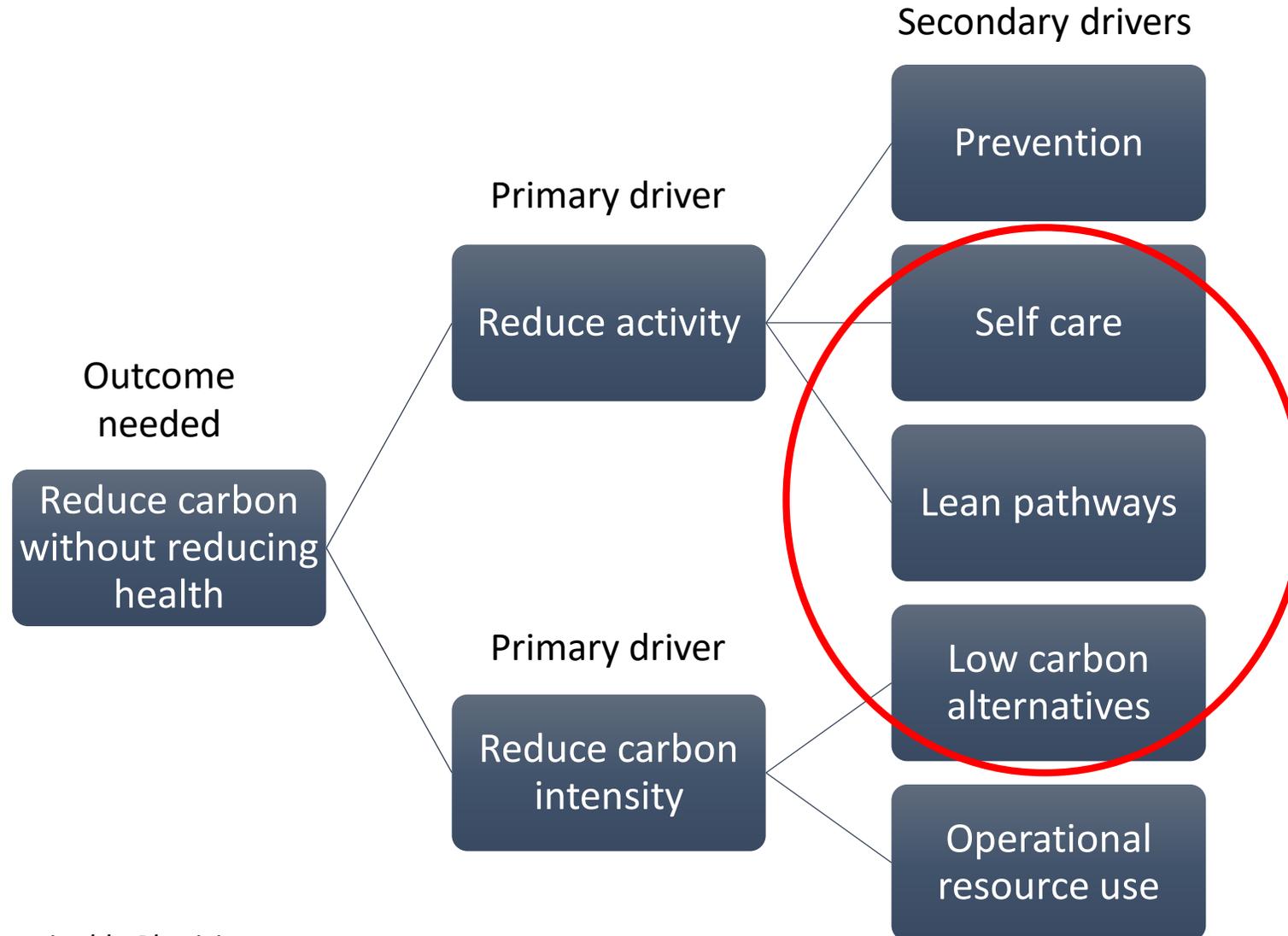


General
anaesthetic?
OR
Local anaesthetic?

Sustainable clinical practice: principles



Sustainable clinical practice: principles



Unnecessary delays in cataract surgery



Clinical Outcomes:

- Reduced operative risk for population of elderly patients with multiple comorbidities



Environmental & Financial:

Reduced use of pre-operative investigations & improved flow through theatres

- £66,300
- 1,794 kgCO₂e/year



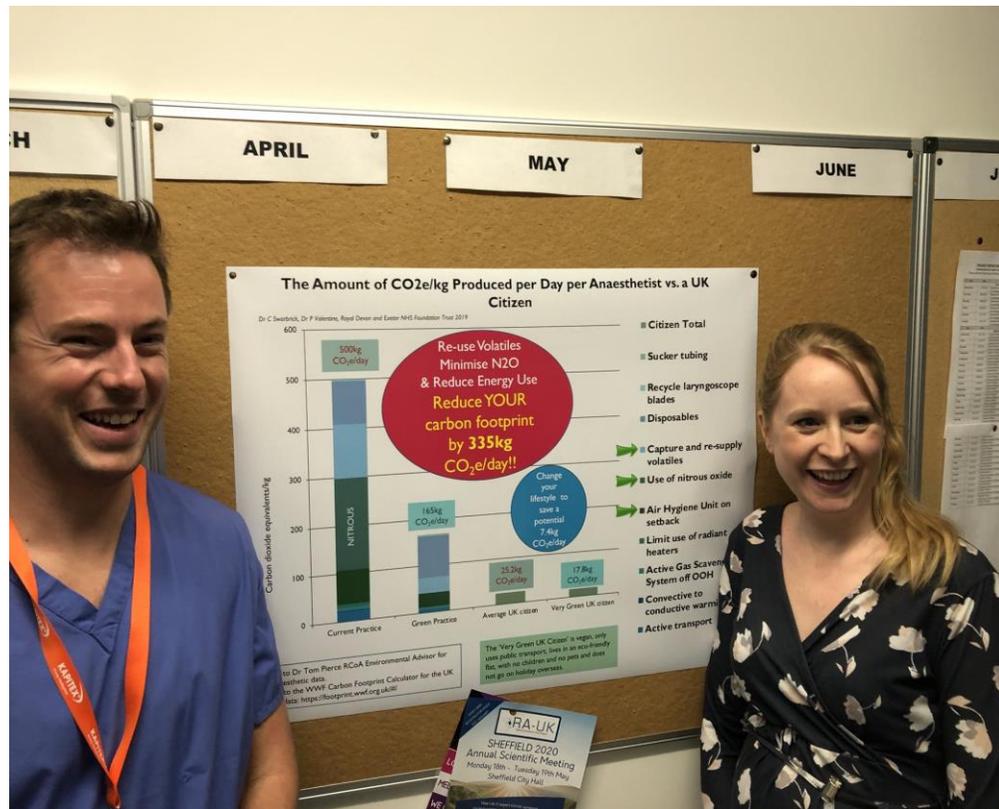
Social:

- Competition empowered nursing staff to raise their concern and be heard
- Education given by anaesthetists to surgeons; improved working relationship
- Reduced need for supporter to accompany patient post-procedure#

May be other inappropriate GAs that were not converted; potential further savings



Judging



- Engage senior leadership
- Thank staff, increase morale
- Build network of staff working for sustainable healthcare

Dr Marina Morgan
Consultant Microbiologist, the Royal Devon &
Exeter Hospital.



Dr Marina Morgan

Consultant Microbiologist, the Royal Devon & Exeter Hospital.

I was humbled by **the sheer enthusiasm of colleagues** in all disciplines, **making sustainable changes** with genuine **tangible benefits** for the environment and patients. The submissions were **innovative, useful and 'doable'**. Much of the work had been done in people's own time, reflecting their passion for making a difference.

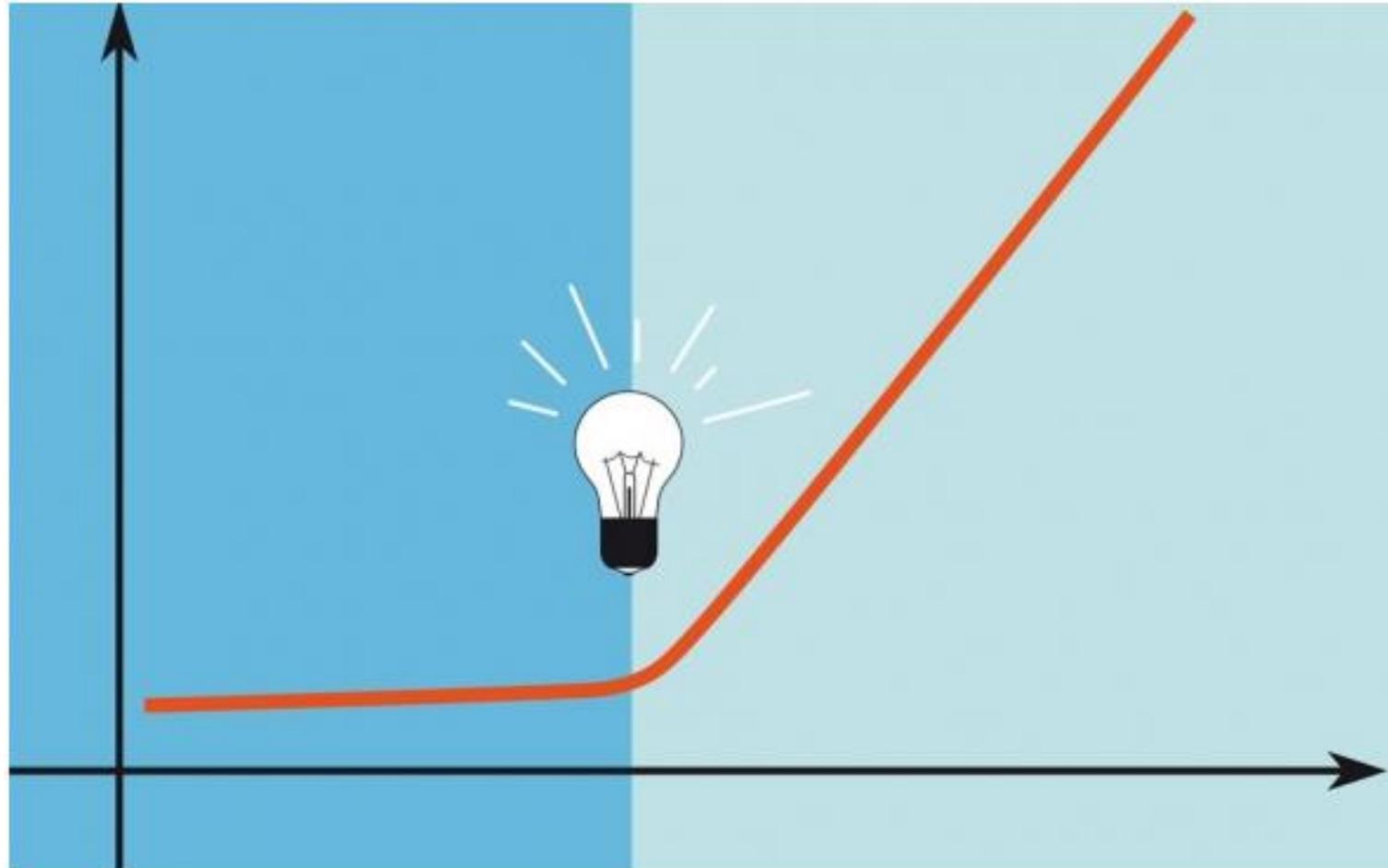
Assessing the **excellent** projects was a real education. I learned so much. I was completely unaware of the fact that hospital staff, like me, will have a much greater impact on the total environmental footprint by changing their daily practice to **prevent** waste rather than by recycling.

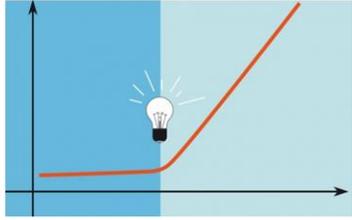
I have been working here for 30 years as a 'bug doc' and I came away feeling that infection control policies may lead, too often, to discarding unused products when it might not be necessary; this **made me think about how I might take environmental aspects into account when making decisions in the future.**

The whole experience was incredibly **enlightening and rewarding.**



Spreading & Scaling

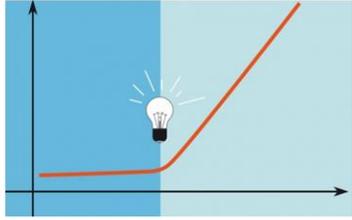




Organisational

Spreading & Scaling

National/International

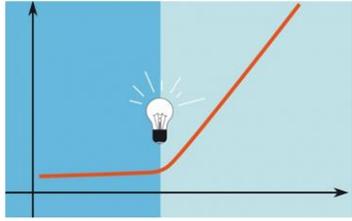


Spreading & Scaling

Organisational

National/International

- QI into SusQI
 - Training QI teams
 - Training materials
 - Fellows/Scholars
- Spread of local projects within Trusts



Spreading & Scaling

Organisational

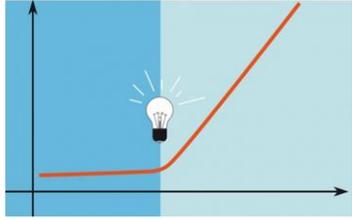
- QI into SusQI
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- Spread of local projects within Trusts

National/International

- Awards





Spreading & Scaling

Organisational

- QI into SusQI
 - Training QI teams
 - Training materials
 - Fellows/Scholars
- Spread of local projects within Trusts

National/International

- Awards
- Conferences

Reducing our carbon footprint and resource use on the Exeter Kidney Unit

Reducing our carbon footprint and resource use on the Exeter Kidney Unit
 A report for the Exeter Kidney Unit and Exeter Health Foundation

INTRODUCTION AND RELEVANCE

The physical and economic effects of climate change have far-reaching consequences for global health.

The delivery of healthcare also results in carbon emissions.

Over a third of the UK's carbon footprint is due to the large public sector contribution of carbon emissions, contributing to over one-third of public sector emissions.

The Climate Change Act sets an 80% reduction in carbon emissions by 2050.

Only 17% of UK emissions are derived from energy usage which has been the main focus of carbon reduction policies to date.

The UK will only reach its target by considering all aspects of emissions, including other service design.

In sectors such as the NHS it is our responsibility to become more resource and environmentally sustainable.

The Centre for Sustainable Healthcare (CSH) is a registered charity that aims to help the NHS fulfil its objective to reduce carbon emissions and resource use.

METHODS

With the CSH we undertook a multidisciplinary team (MDT) QIP making changes to our greater environmental sustainability.

We did this by:

- Reducing duplication in distribution cycles across 31 machines by only running the 'hard' (over) cycle on the end of the day (the 'hard' distribution cycle) and a 'soft' (over) cycle on the 'hard' (over) cycle. This reduces the distribution cycle from once each day to once a week.
- Revised 33 existing machines (dialysis) with new machines (dialysis) that can be switched on a 'standby' mode following printing to save on power use.
- Patients were asked to bring their own bottles that can be stored in the unit between visits, saving on emissions and resource use (bottles, transport).
- Separating home haemodialysis machines results in a reduction in power usage per cycle and the potential for packaging to be recycled to promote recycling.
- Things will change on 'Meat Free Monday'!

RESULTS

The MDT achieved the environmental impact and financial savings of implementing the QIP on one unit over one year using data provided from our Home Unit and the Department of Environment, Food and Rural Affairs.

The potential carbon footprint reduction was 714,441 kgCO₂e, potential water savings were 246,334 litres and financial savings were estimated at £6081.26. These figures are based on one unit over one year.

CONCLUSION AND FUTURE RECOMMENDATIONS

The NHS has a significant challenge in transforming clinical services to reduce carbon emissions. As the NHS we are responsible for improving the quality of our services, including introducing changes to practice to be more environmentally sustainable and protect the health of current and future generations.

We plan to roll out the changes to all satellite units.

Scaling & Scaling

National/International

- Awards

- Conferences

- Specialty



CHRONIC KIDNEY DISEASE AND EXETER KIDNEY UNIT

Chronic kidney disease affects 10% of the worldwide population and over 5 million people are dependent on dialysis or a kidney transplant to stay alive.

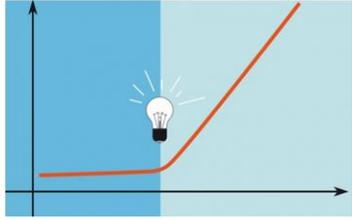
Over one 400 patients who receive treatment for kidney failure live in different countries with universal access to healthcare.

In the UK renal medicine was amongst the first medical specialties to measure its environmental impacts with the 'Green Renology' initiative.

The Exeter Kidney Unit serves a population of one million with the satellite dialysis units. We undertook a multidisciplinary team project to make changes to reduce greater environmental sustainability in our unit.



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Spreading & Scaling

Organisational

- QI into SusQI
 - Training QI teams
 - Training materials
 - Fellows/Scholars
- Spread of local projects within Trusts

National/International

- Awards
- Conferences
 - Specialty
 - **Sustainability**

Spreading & Scaling



University of Brighton
School of Health Sciences



CENTRE for
SUSTAINABLE
HEALTHCARE
inspire • empower • transform

 **brighton and sussex**
medical school

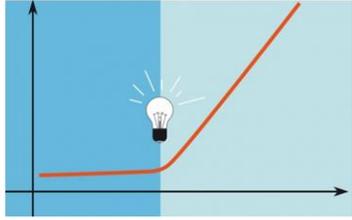


**Sustainable
Healthcare
Academic
Research
Collaboration**

SHARC 2020 Conference

Friday 1 May 2020 09:30-16:30

University of Brighton Falmer Campus
Checkland Building C122 BN1 9PH UK



Spreading & Scaling

Organisational

- QI into SusQI
 - Training QI teams
 - Training materials
 - Fellows/Scholars
- Spread of local projects within Trusts

National/International

- Awards
- Conferences
- CSH online
 - Case studies
 - Mapping
 - Networks

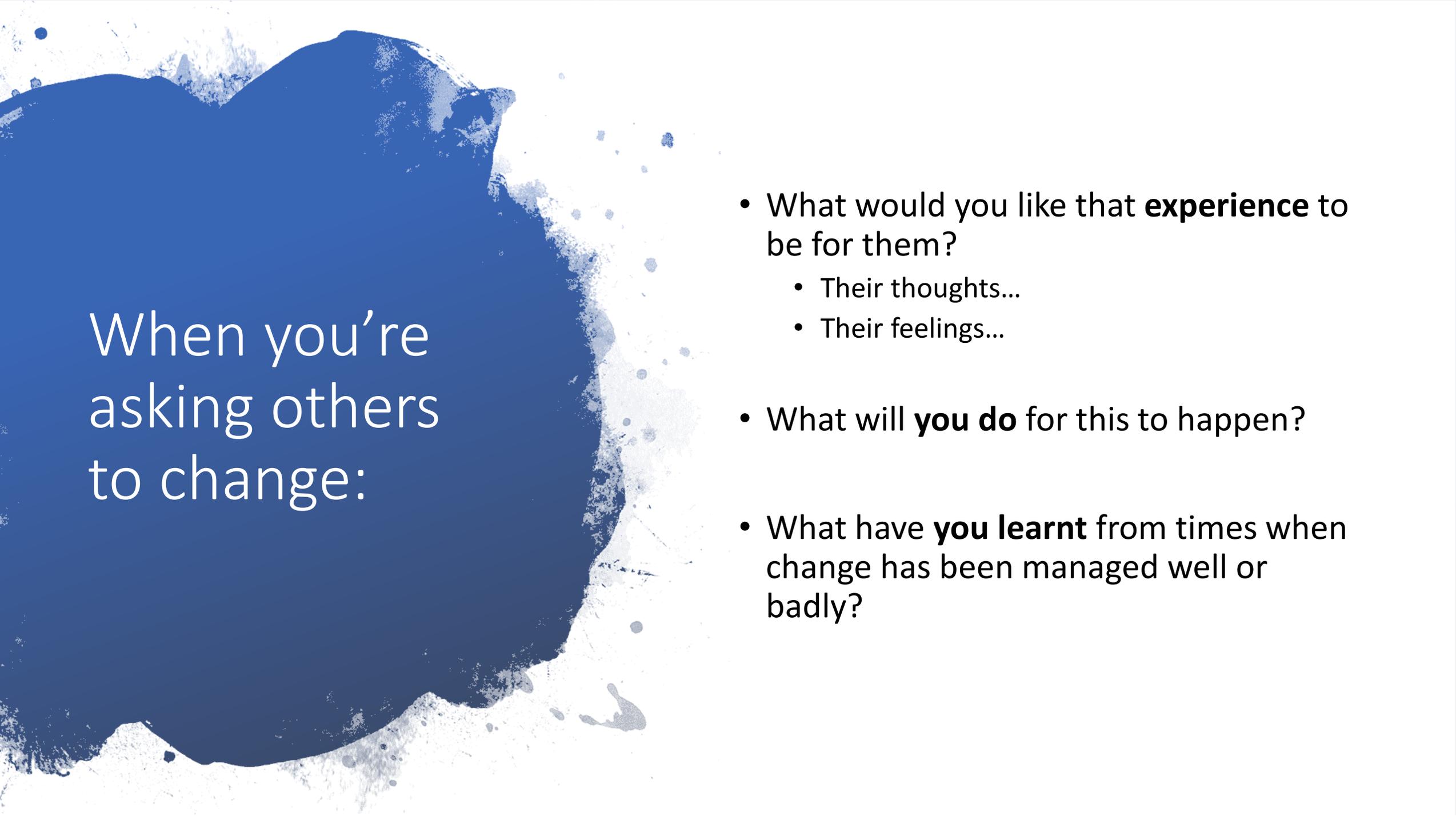
Is Sustainable Healthcare Possible?

The future is unwritten....

The future is unwritten....

And is ours to write





When you're
asking others
to change:

- What would you like that **experience** to be for them?
 - Their thoughts...
 - Their feelings...
- What will **you do** for this to happen?
- What have **you learnt** from times when change has been managed well or badly?



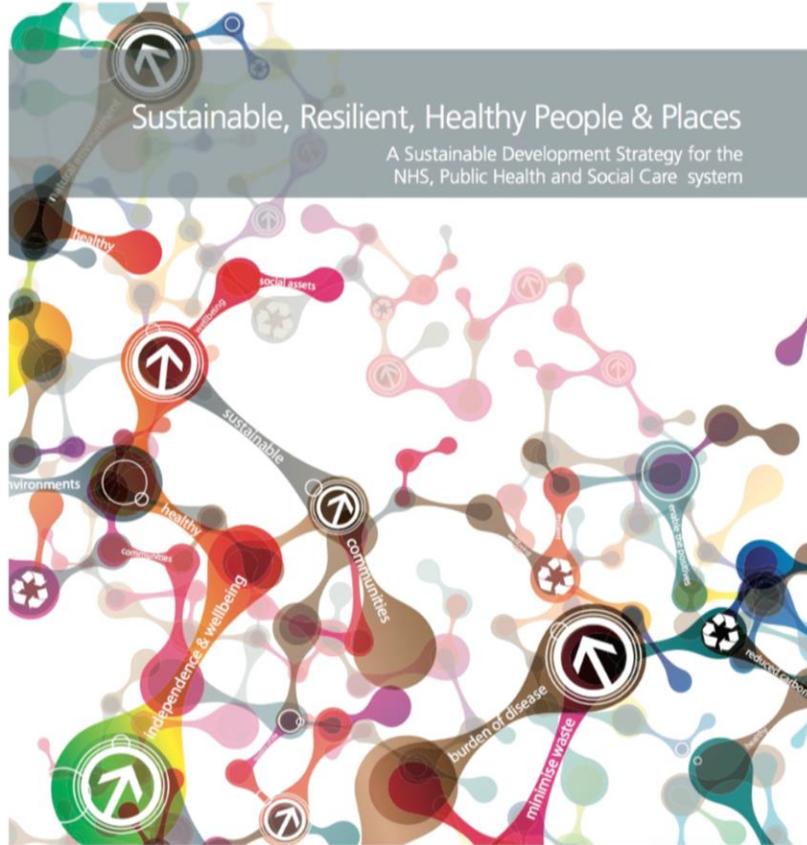
When you're
asking others
to change:

- Asking **open questions**
 - Less threatening
 - Inviting others to think
 - Explore their opinion
- **Listen**
- Give people **options**
 - People like to be autonomous
 - Feeling out of control invites hostility
- Expect to have lots of **conversations**
- **Thank people** for listening, making **any** change is hard, especially when under pressure...
- The **Gentle** Art of Persuasion
 - Gentleness can go with firmness
 - Avoid forcing, punishing, threatening, ordering, shaming, finger pointing OR taking the moral high ground
 - Make the new way of doing things attractive, if possible

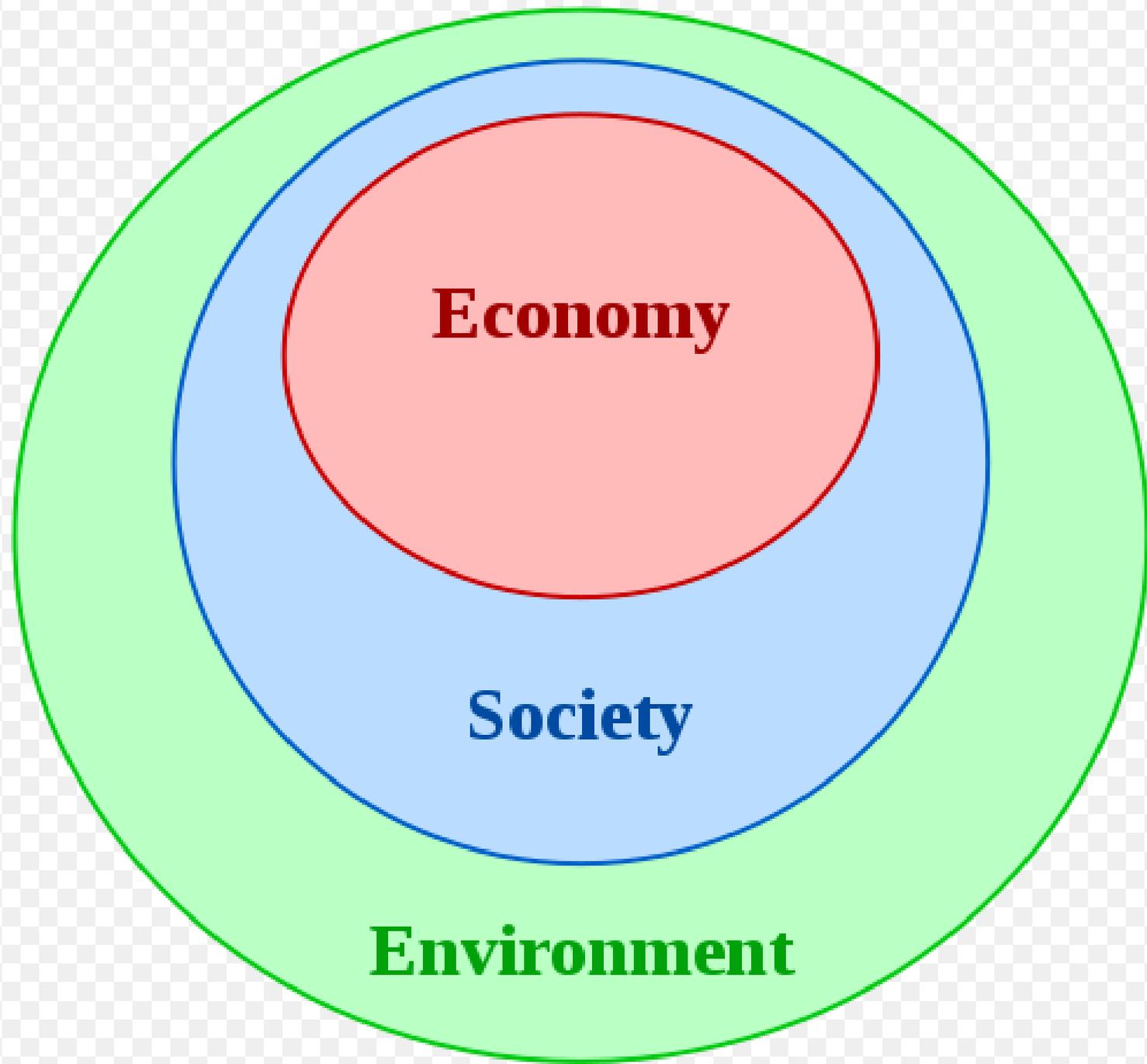
What does Sustainable Healthcare
mean to you?

Sustainable, Resilient, Healthy People & Places

A Sustainable Development Strategy for the
NHS, Public Health and Social Care system



“Our vision of sustainable health and care: A sustainable health and care system works within the available environmental, social and financial resources, protecting and improving **health** now and for future generations.”



Economy

Society

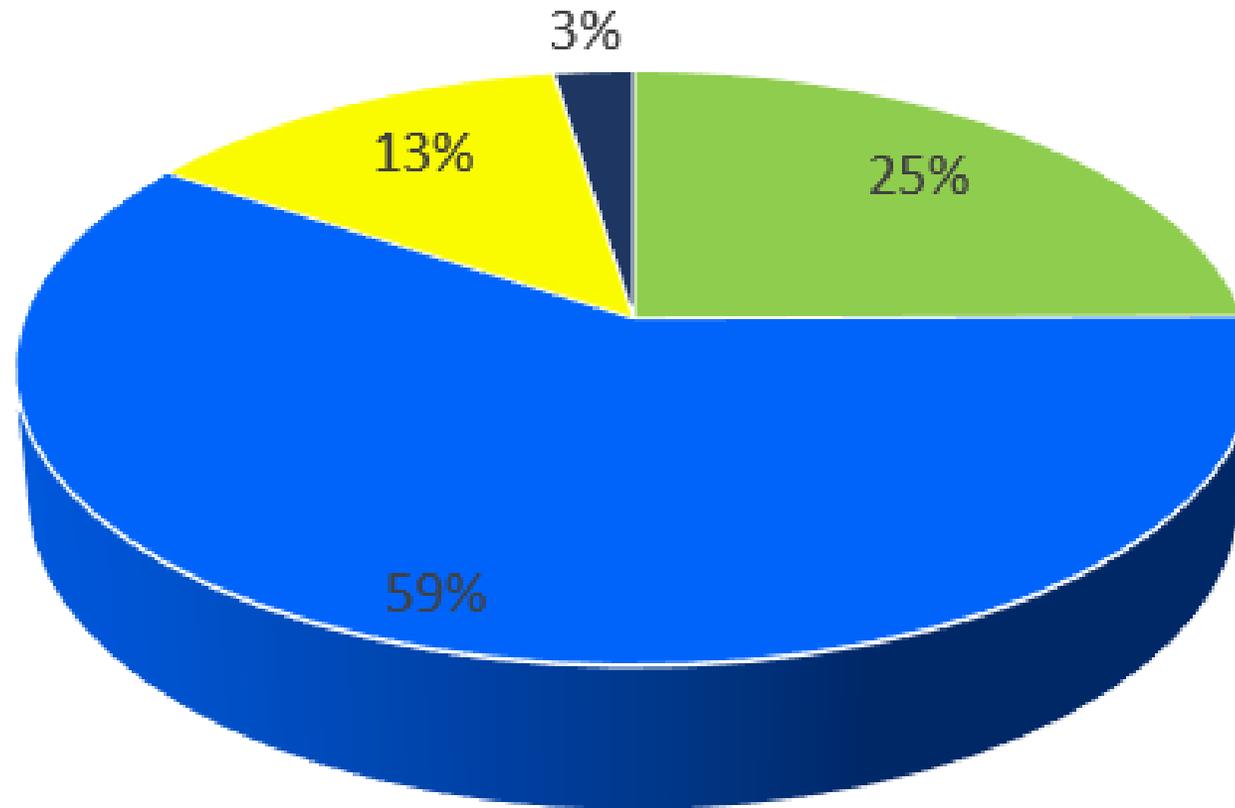
Environment

Where should we focus
our carbon-cutting efforts?

Where should we focus
our carbon-cutting efforts?

On the biggest contributing factors

Carbon Footprint of NHS England – 21.54 MtCO₂e



Examining the hotspots

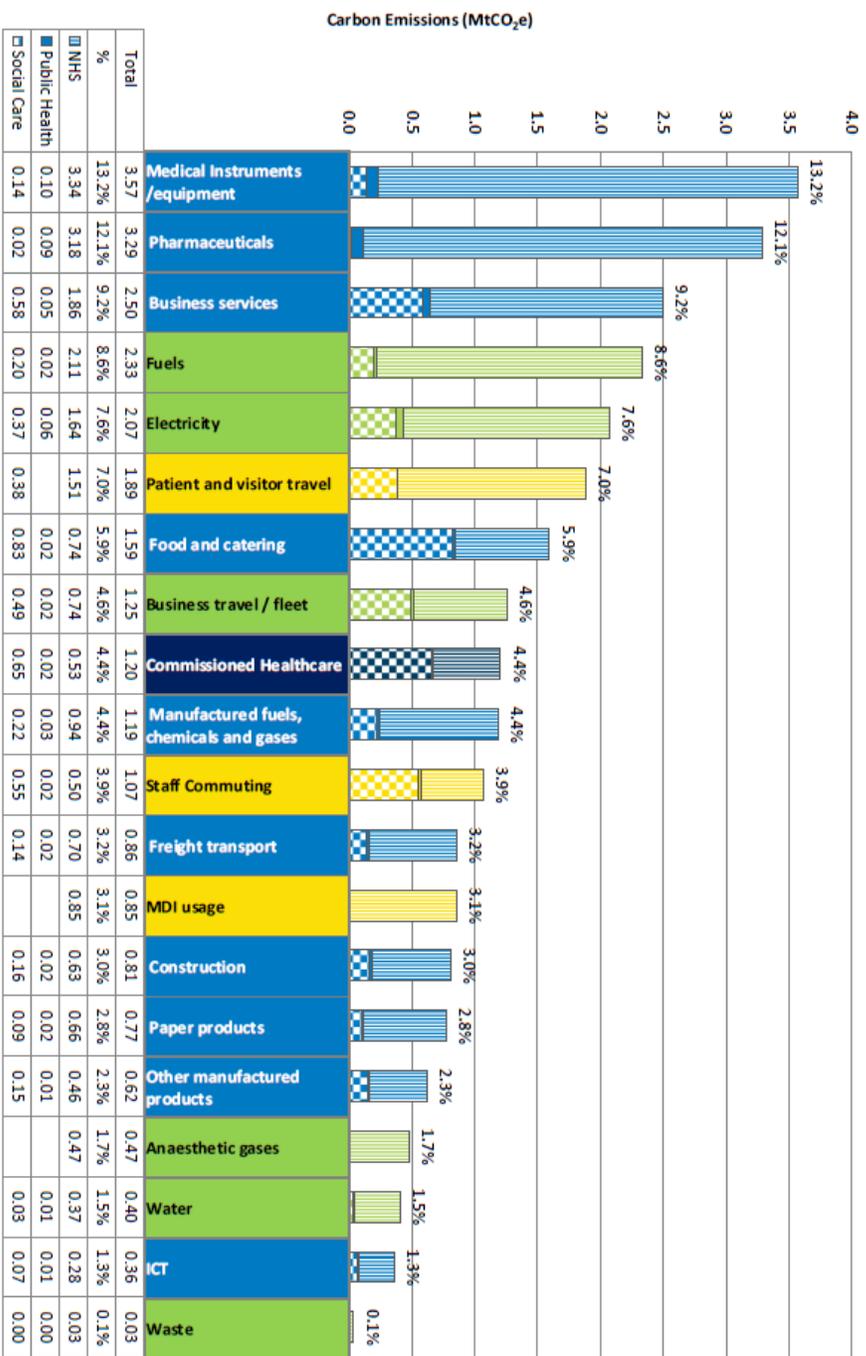


Figure 4. Health and Social care detailed breakdown 2017

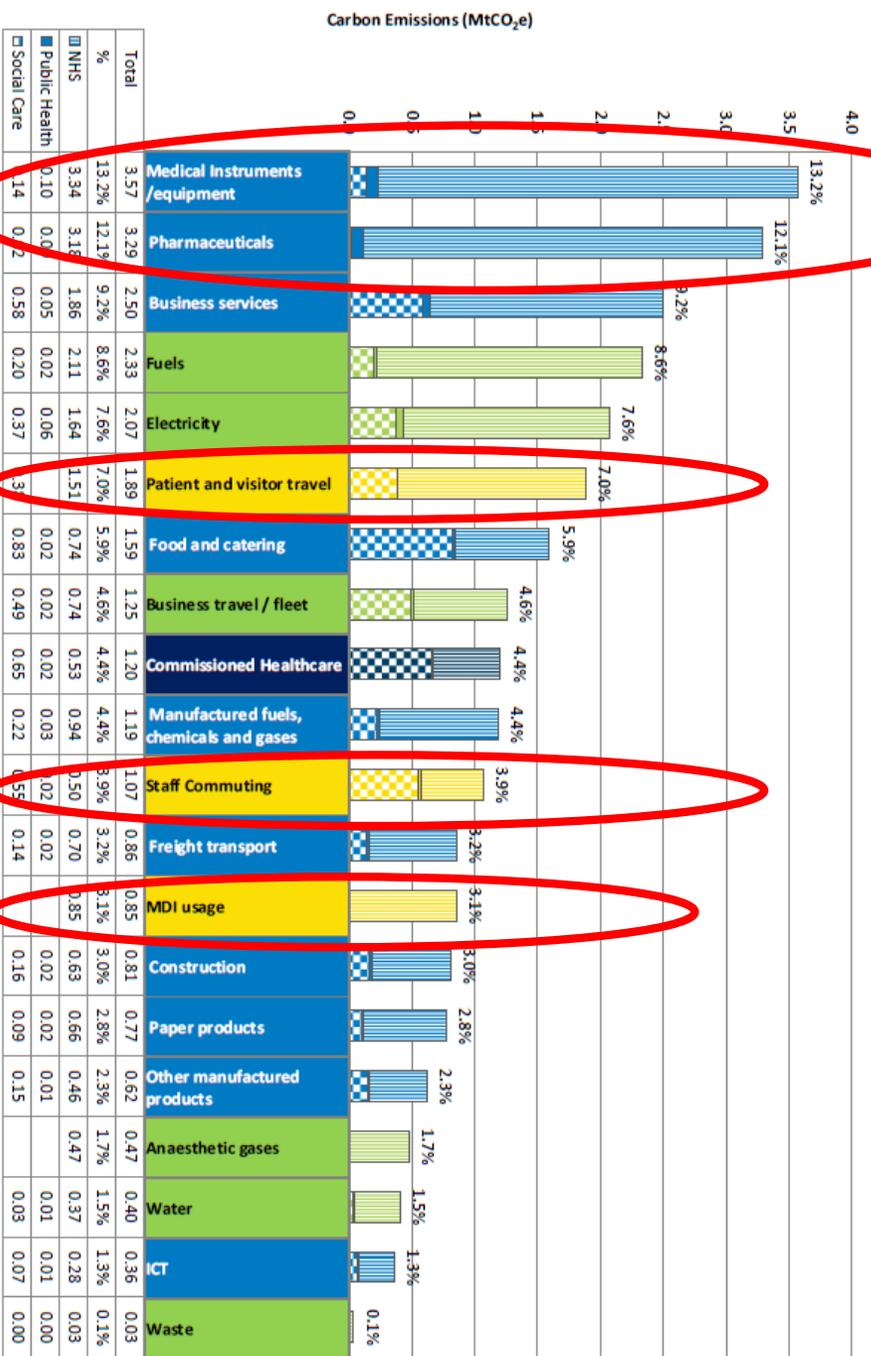
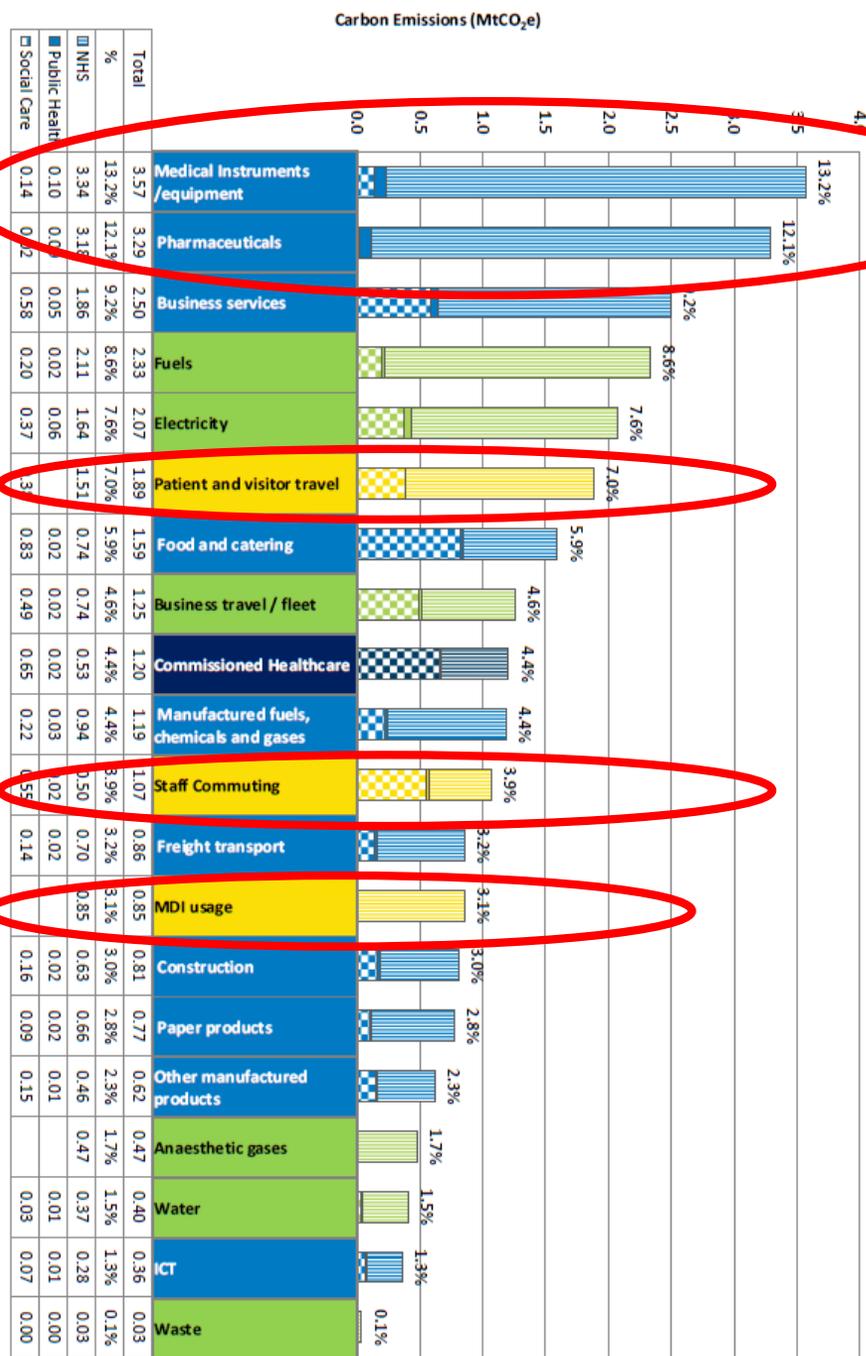


Figure 4. Health and Social care detailed breakdown 2017



Figure 4: Health and Social care detailed breakdown 2017



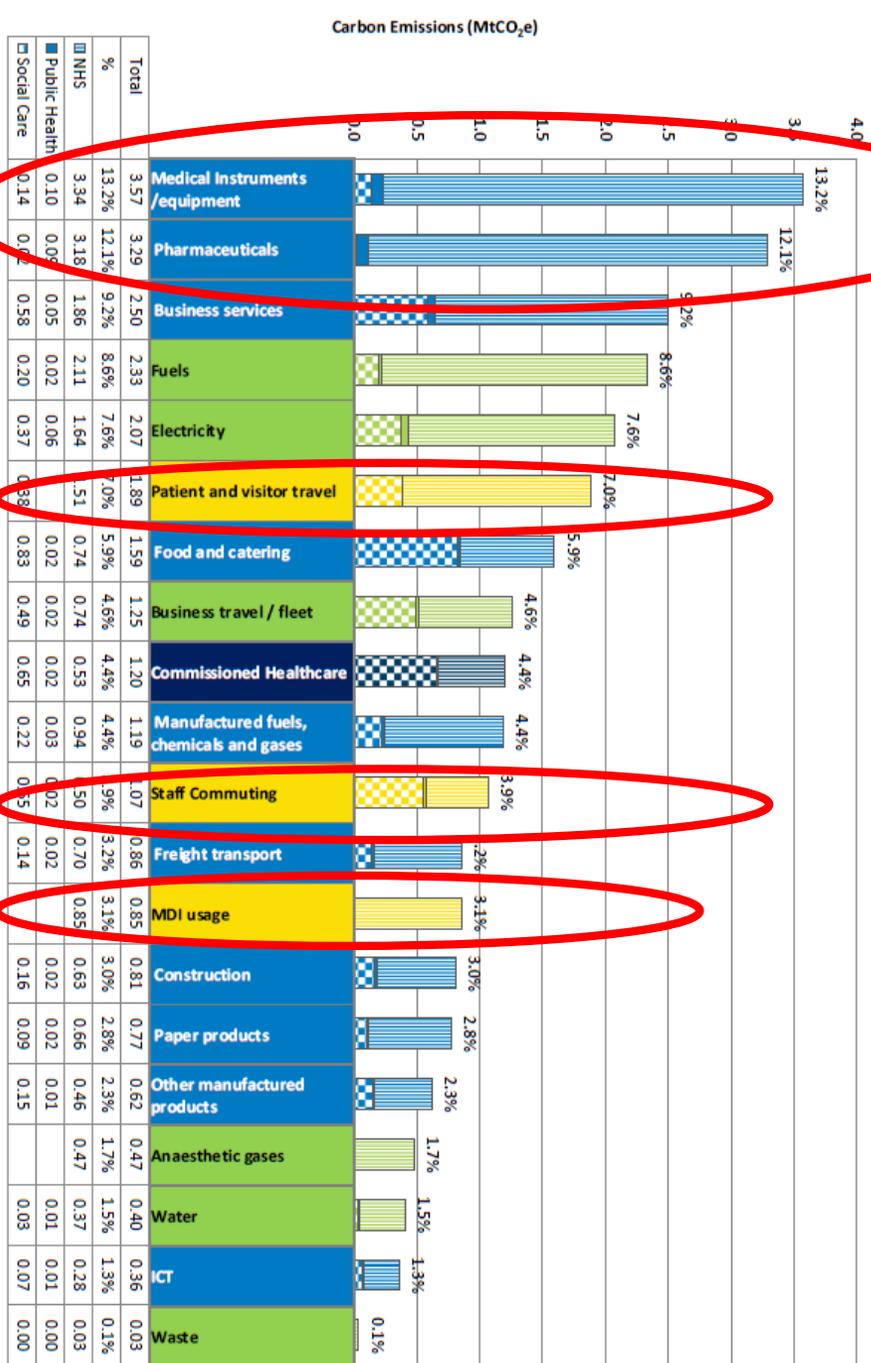
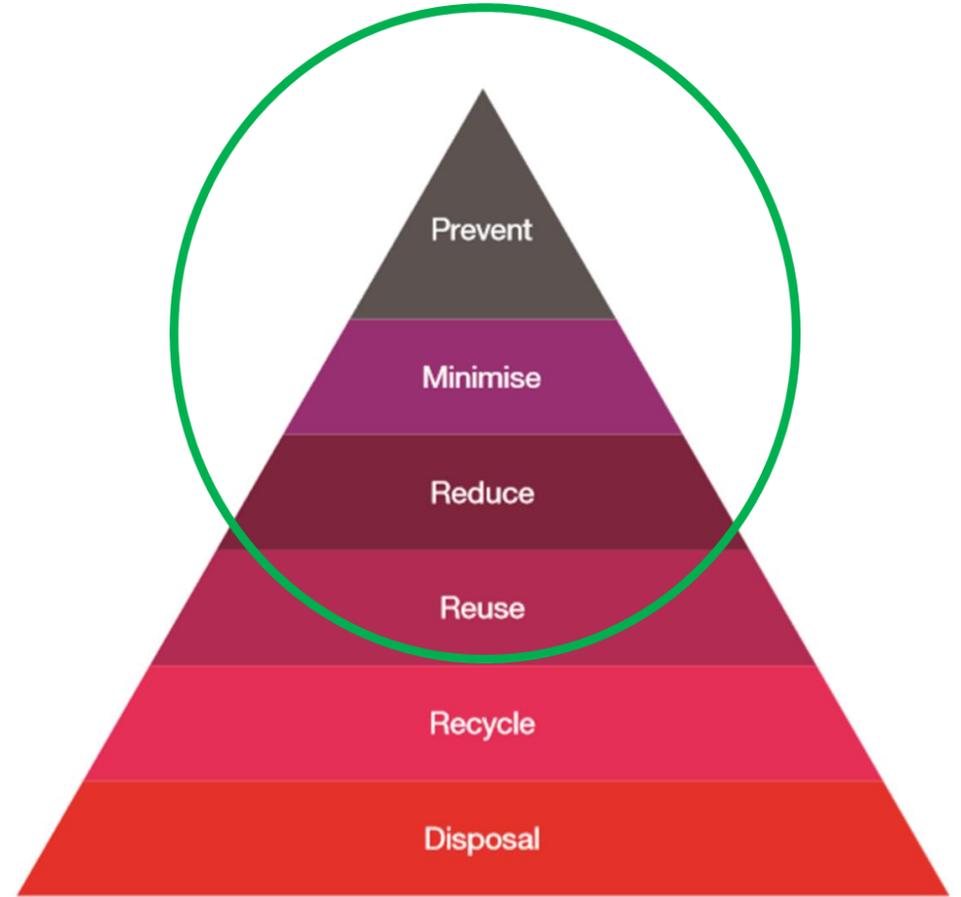
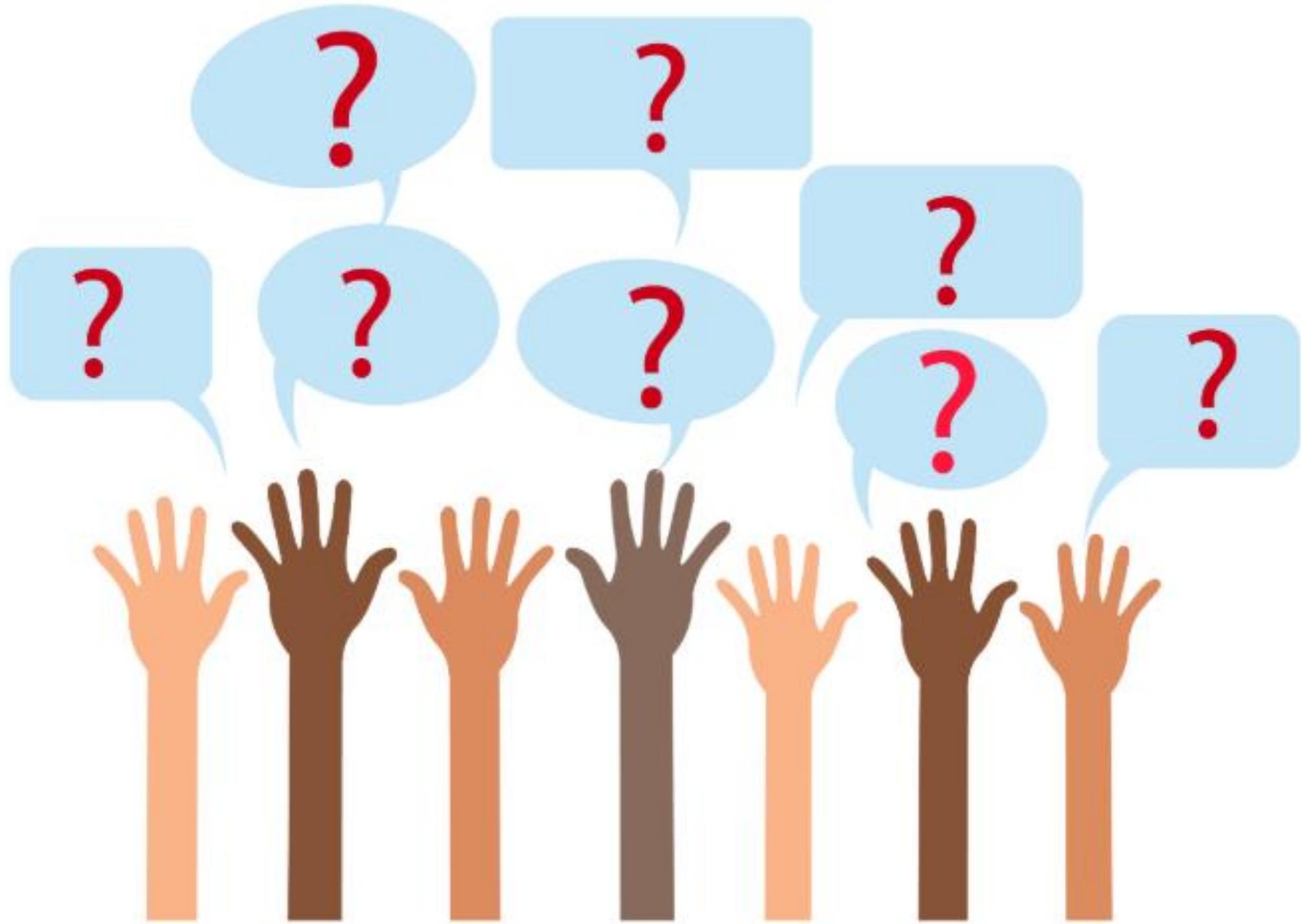
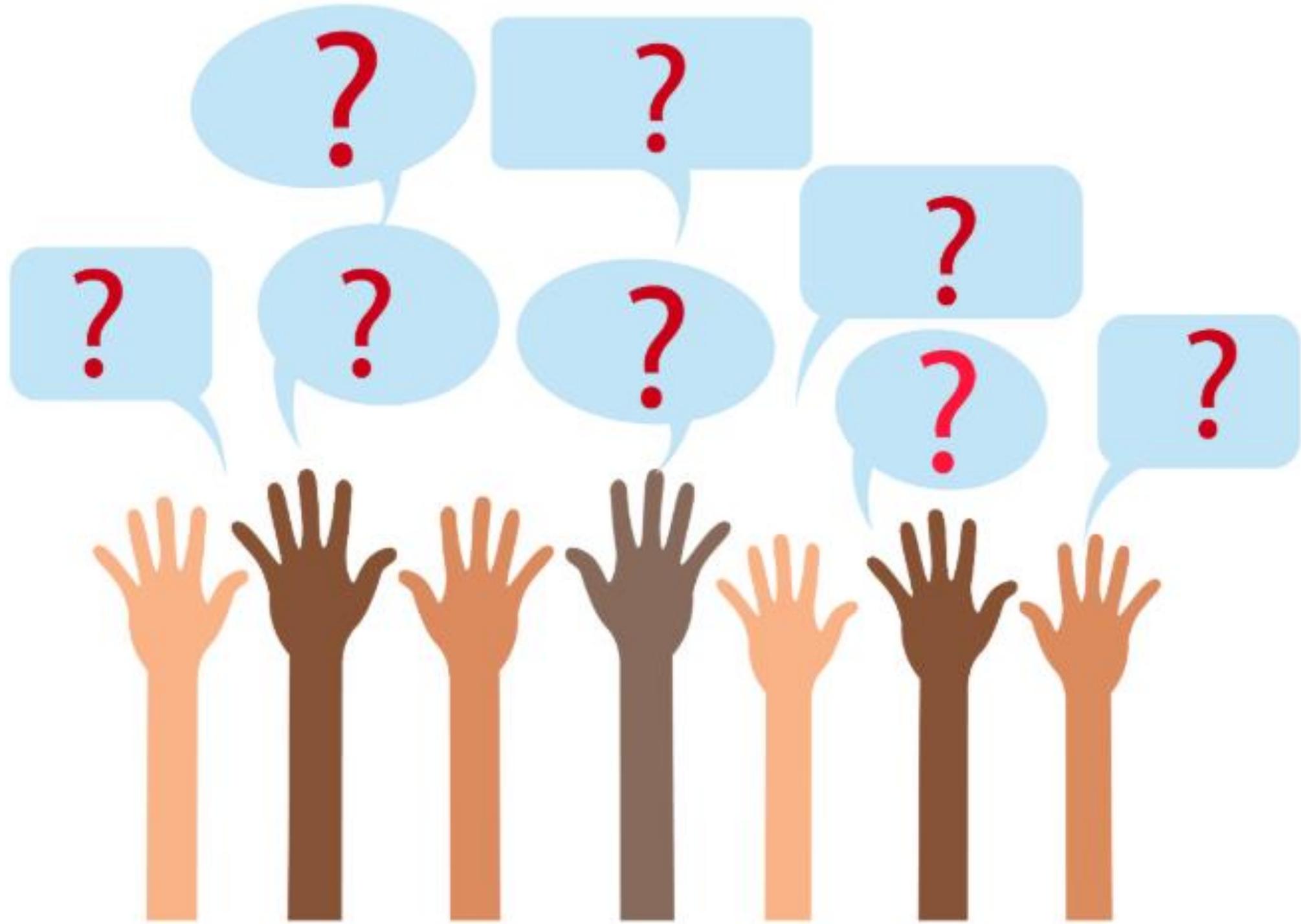


Figure 4. Health and Social care detailed breakdown 2017

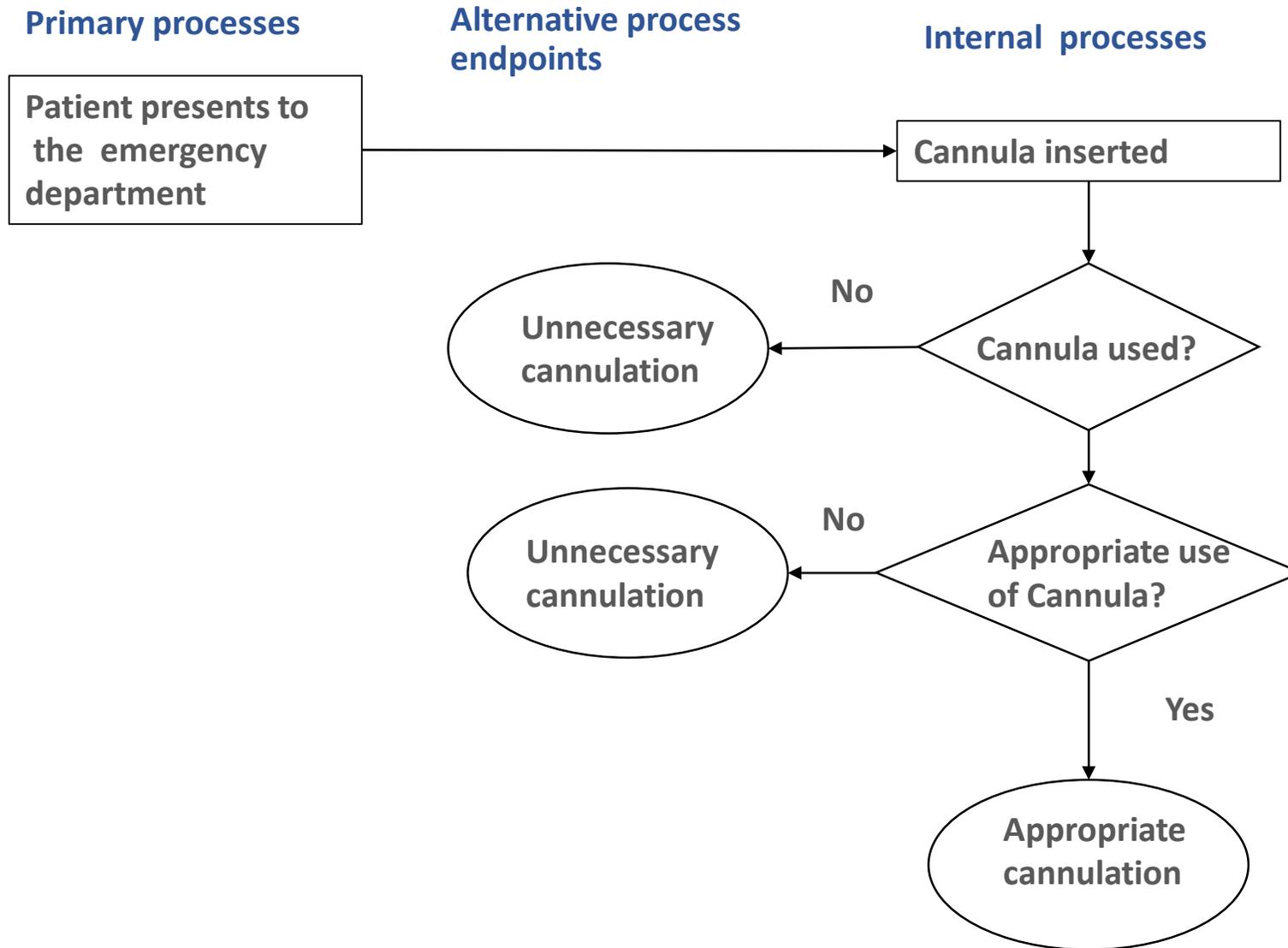


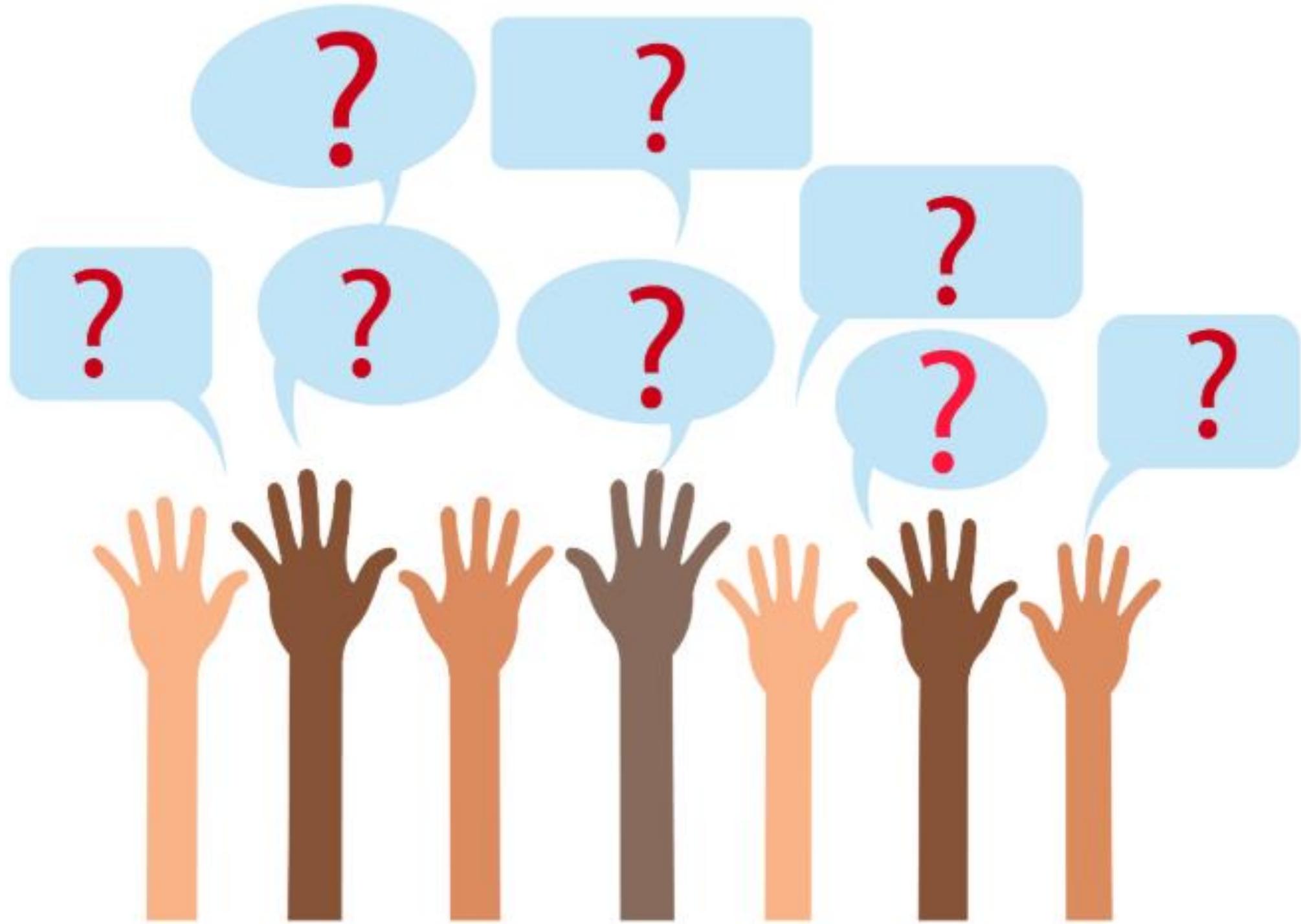


Where does waste happen in clinical practice &
How can we address it?



Process map





Welcome to



GREEN WARD
COMPETITION
CENTRE FOR SUSTAINABLE HEALTHCARE

Over to you...

Time to create!

What does 'waste' look like in healthcare?

- Words we use...

What does 'waste' look like in healthcare?

- Words we use...



What does 'waste' look like in healthcare?

- Words we use...



What does 'waste' look like in healthcare?

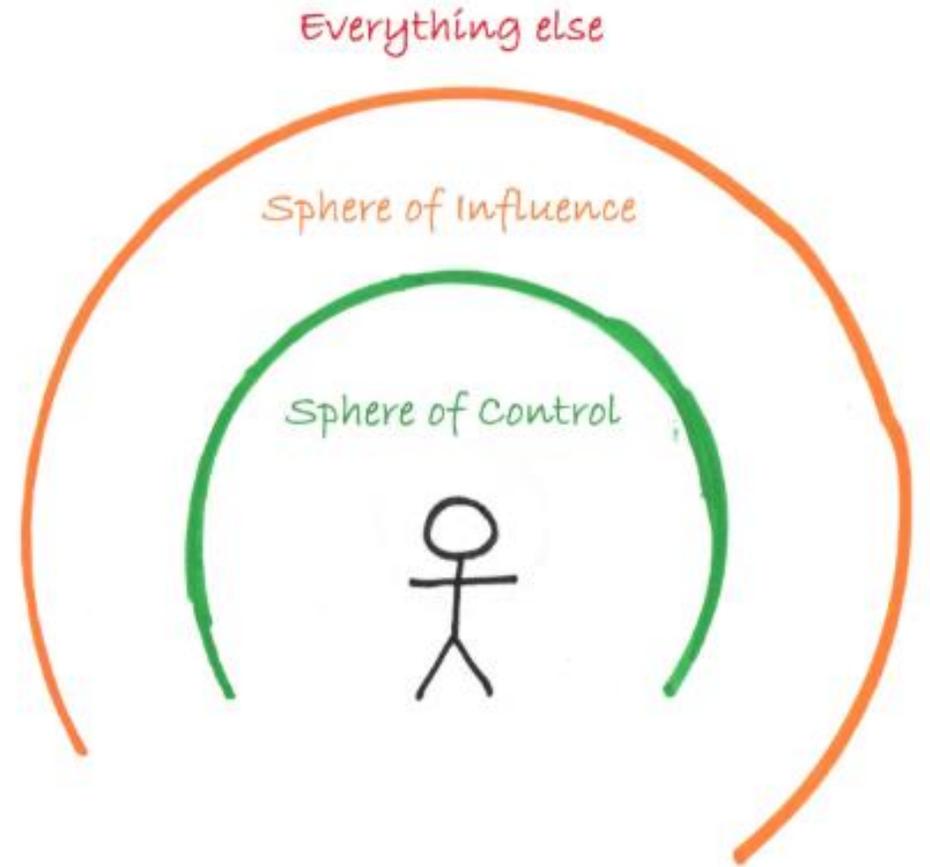
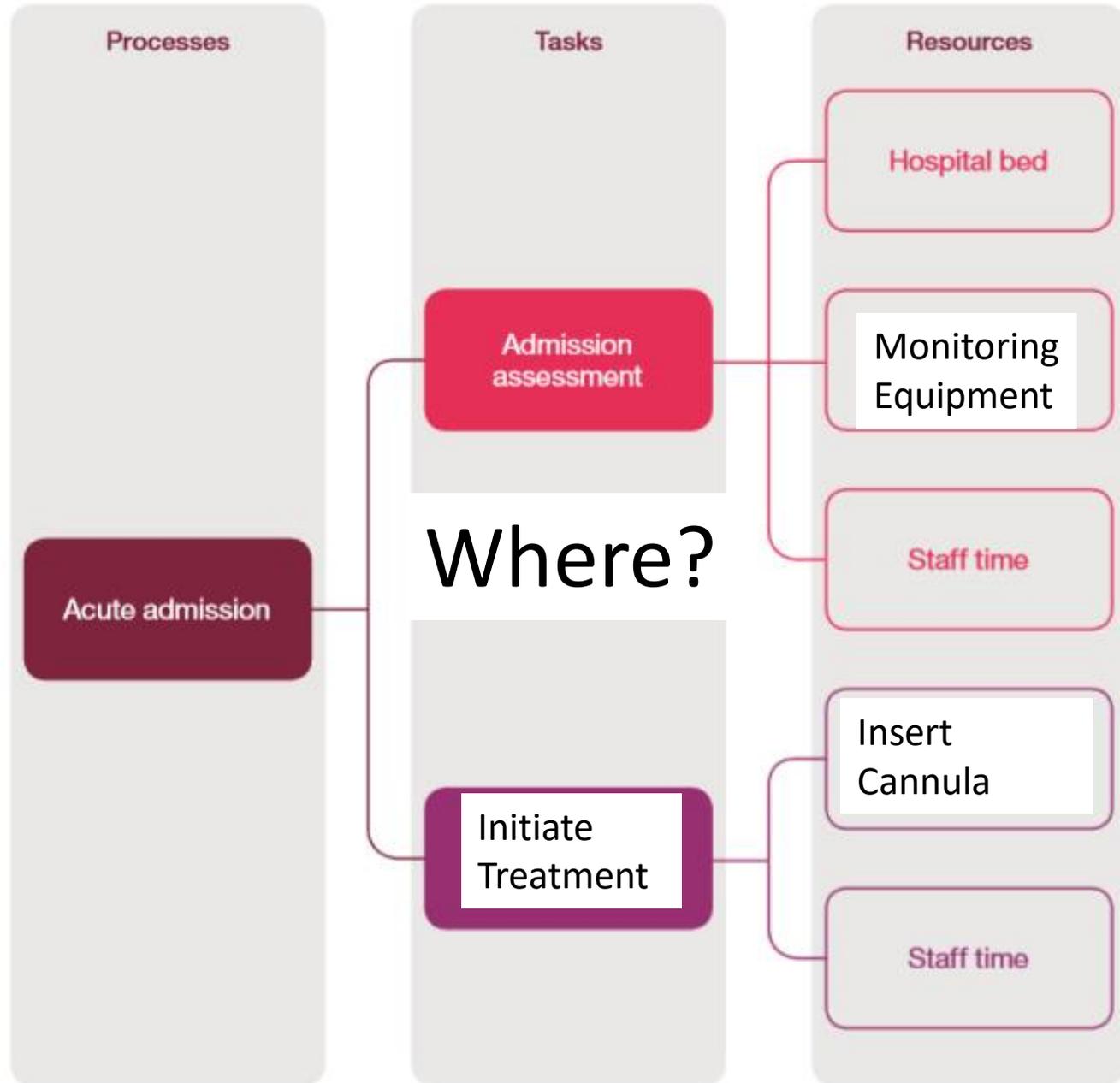
- Words we use...



- Exercise

- Write down words that '**pop out**' as important in your daily work?
- Any words that you could **add** to the list?
- Specific examples

Figure 2. Clinical resources, tasks and processes



Learning Objectives

- To be able to **define** Sustainable Healthcare
- Identify **carbon hotspots** in your service
- Come up with project ideas that are:
 - Focussed on **clinical** care
 - Tackle **carbon hotspots** in your service
 - **Measurable** using the '**triple bottom line**' (environmental, social & financial impact)
 - Fits with your/your team's **priorities/interests**, is **SMART** and within your sphere of influence

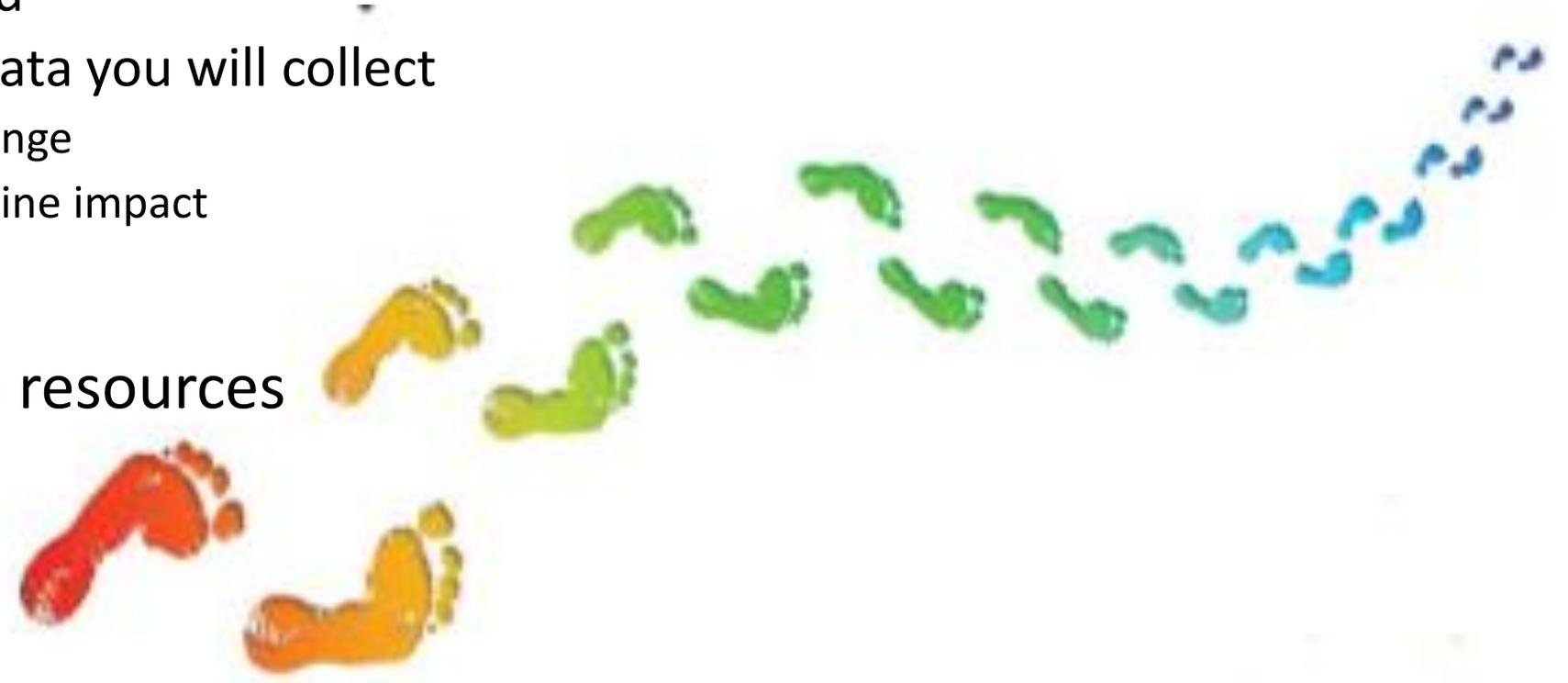
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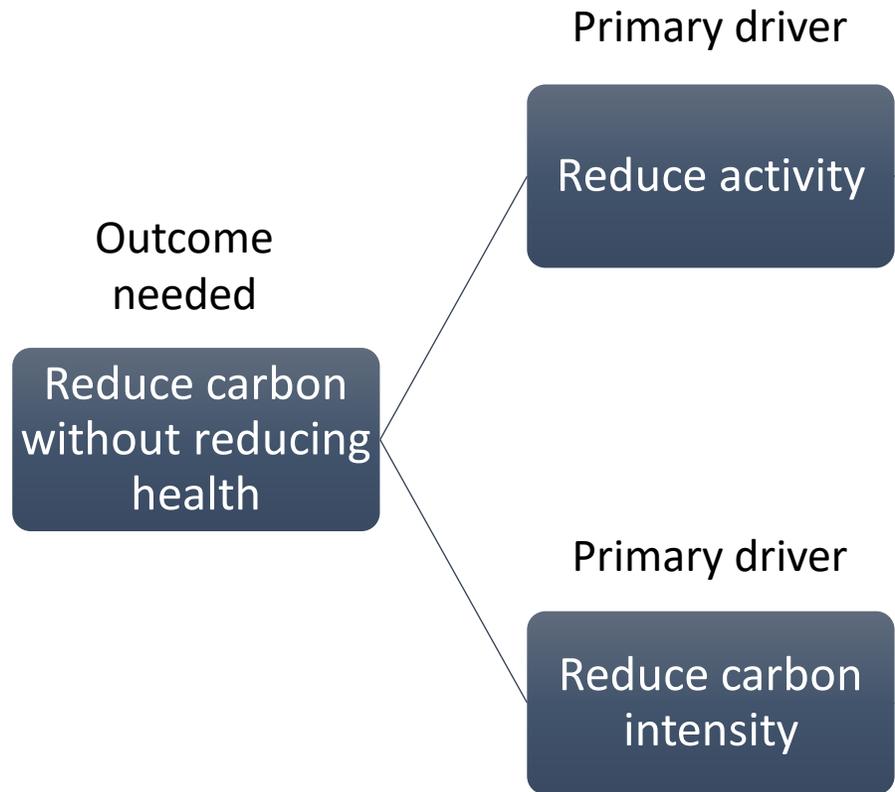
And is yours to write

Next steps

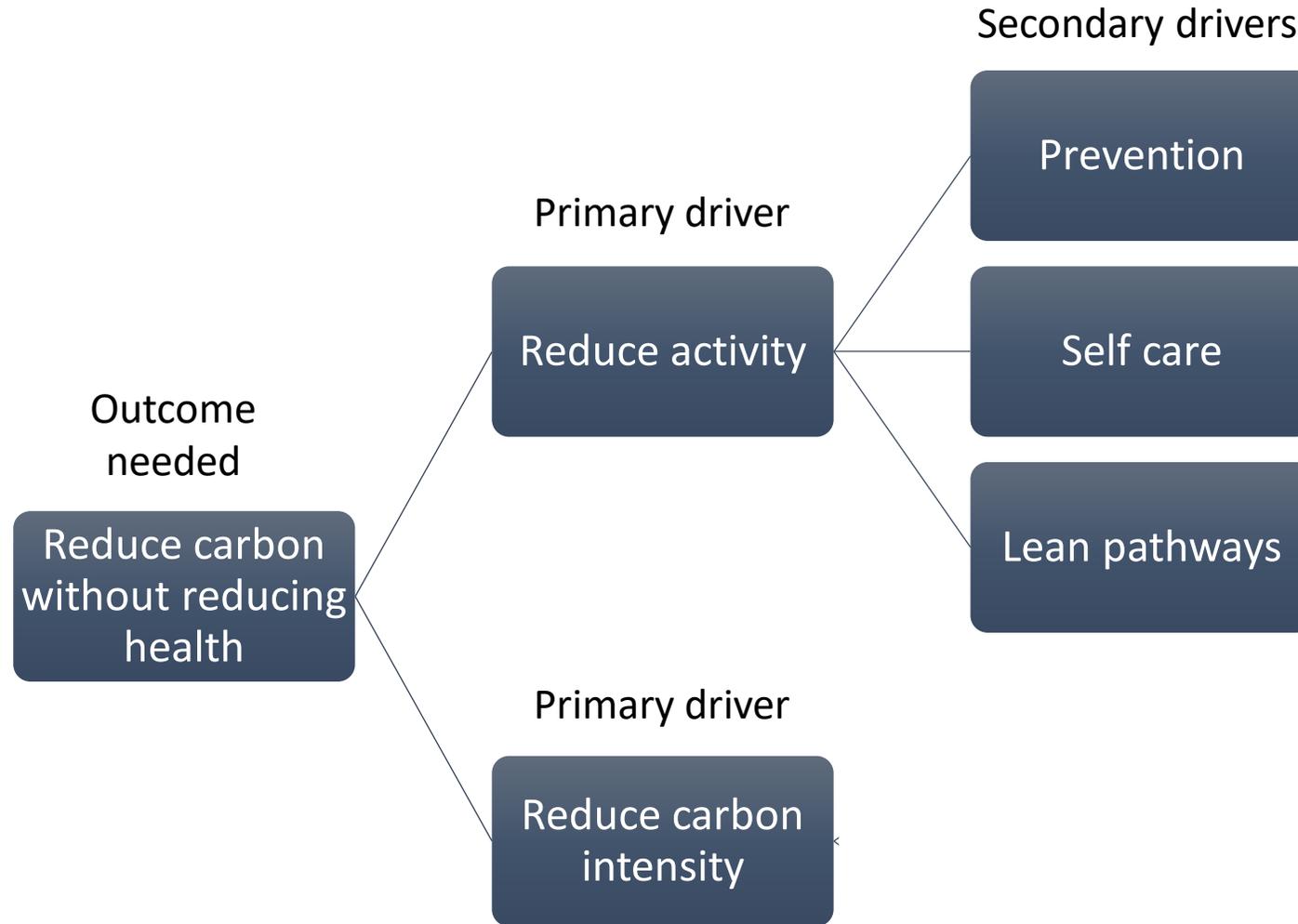
- Appointment for a call
 - Decided which project
 - Devised method
 - Ideas on what data you will collect
 - Baseline & change
 - Triple bottom line impact
- We will send you resources



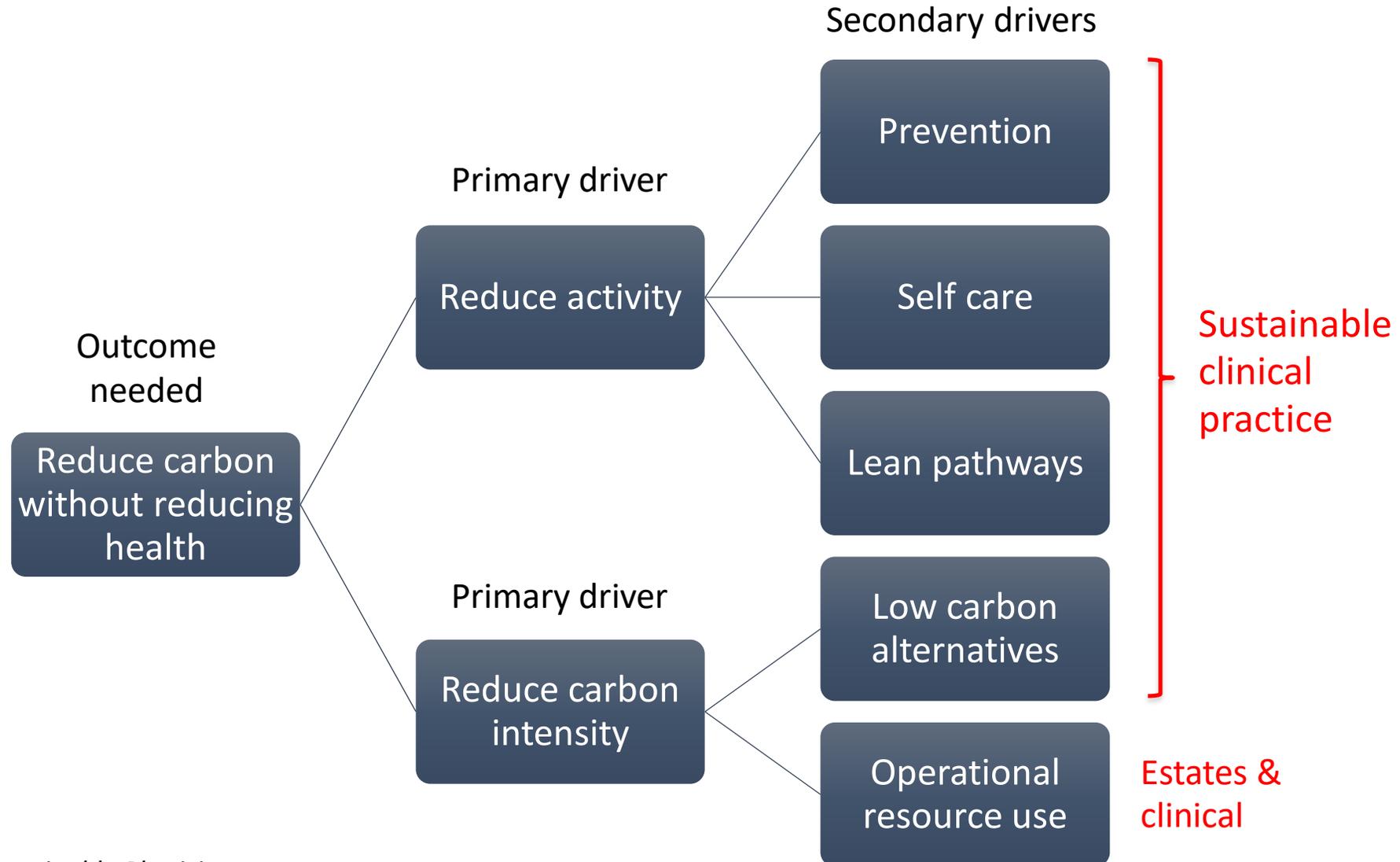
Sustainable clinical practice: principles



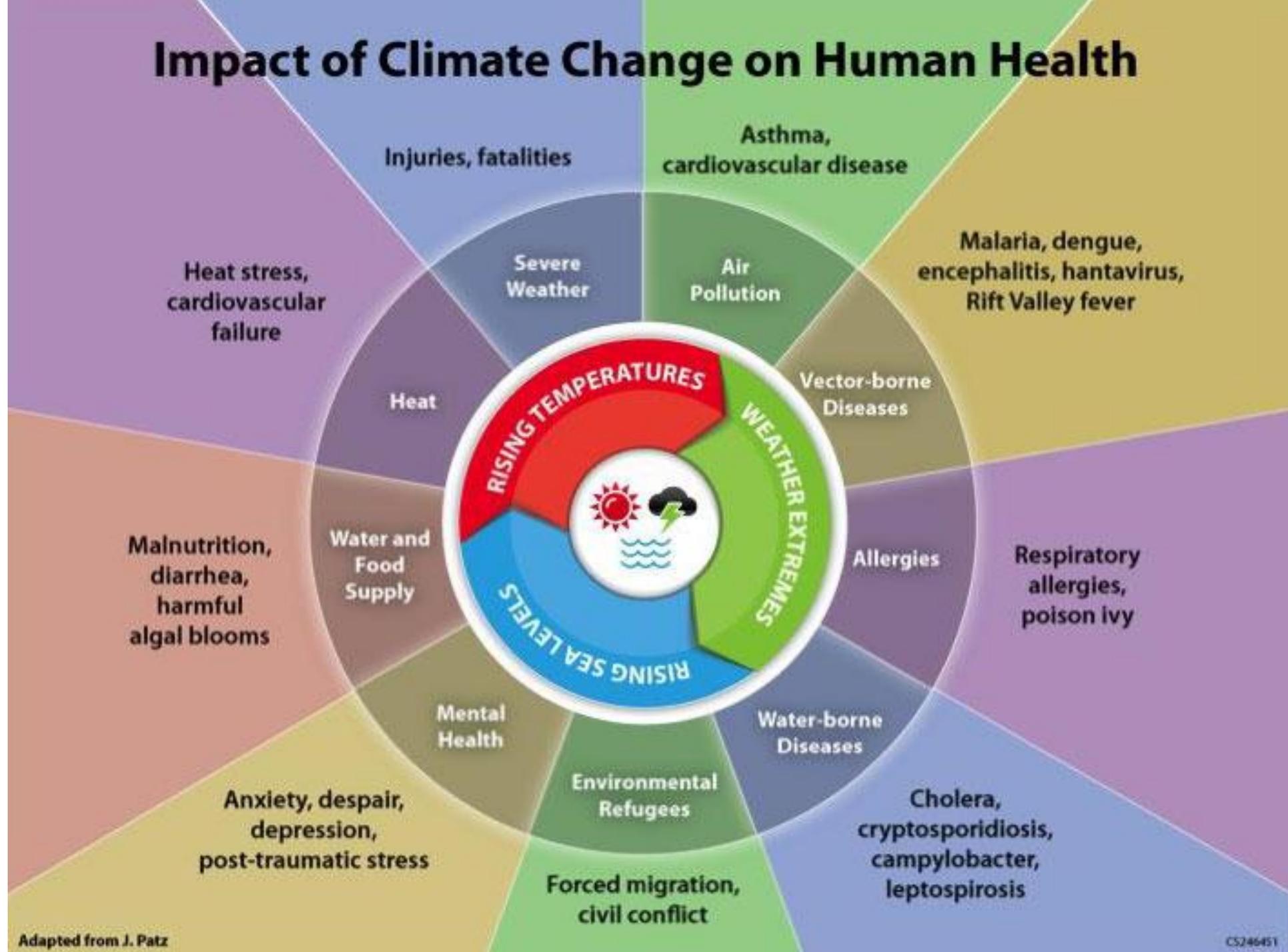
Sustainable clinical practice: principles



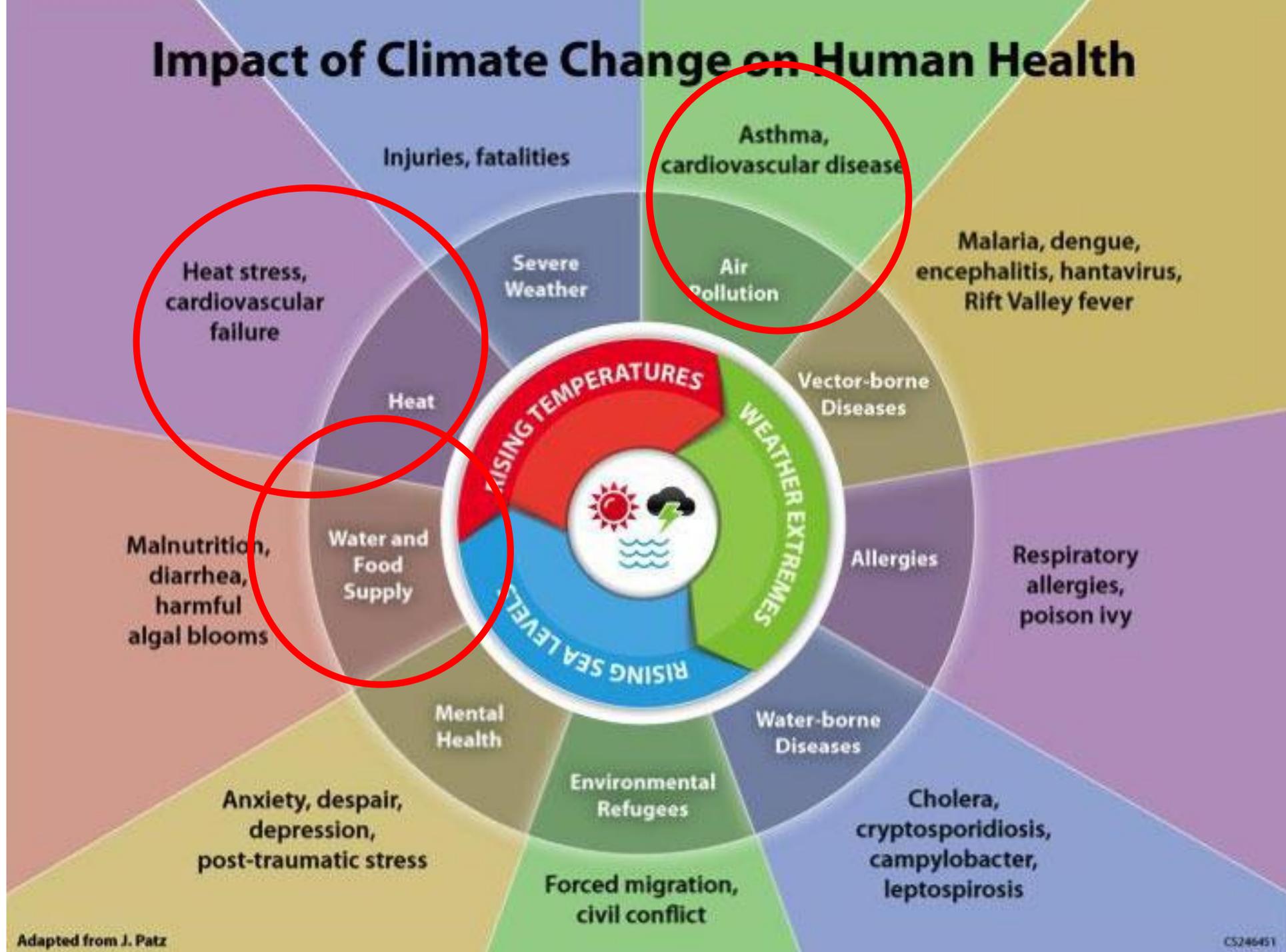
Sustainable clinical practice: principles



Impact of Climate Change on Human Health



Impact of Climate Change on Human Health



Learning Objectives

- To define **sustainable healthcare**
- Come up with project ideas that are:
 - Focussed on **clinical** care
 - Tackle **carbon hotspots** in your service
 - High up the 'waste triangle'



Learning Objectives

- To define **sustainable healthcare**
- To identify **carbon hotspots** in your service
- Come up with project ideas that are:
 - Focussed on **clinical** care
 - Tackle **carbon hotspots** in your service
 - High up the 'waste triangle'
 - Address the '**triple bottom line**' (environmental, social & financial)
 - Fit your team's **priorities/interests** and are **SMART**

Primary Processes

- 1
- 2
- 3
- 1

Patient presents to
Emergency
Department

Alternative process end point

Internal Processes

- 4
- 2
- 4
- 1

Cannula inserted

Key

Ecological Cost

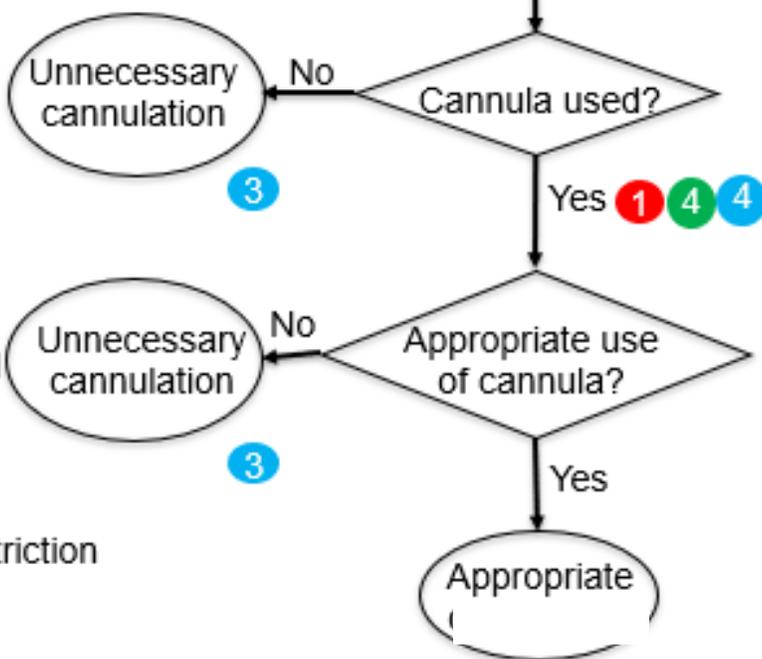
- 1 Patient travel
- 2 Staff travel
- 3 Building construction, electricity, heating
- 4 Equipment manufacture & disposal

Social Cost

- 1 Patient time
- 2 Patient discomfort / restriction
- 3 Risk of patient harm
- 4 Staff time

Financial Cost

- 1 Equipment purchase and disposal



Overview of sustainability and health

Rachel Stancliffe

Director, Centre for Sustainable Healthcare, Oxford, UK

@SusHealthcare

Q-Visit, Oxford, 11 March 2020



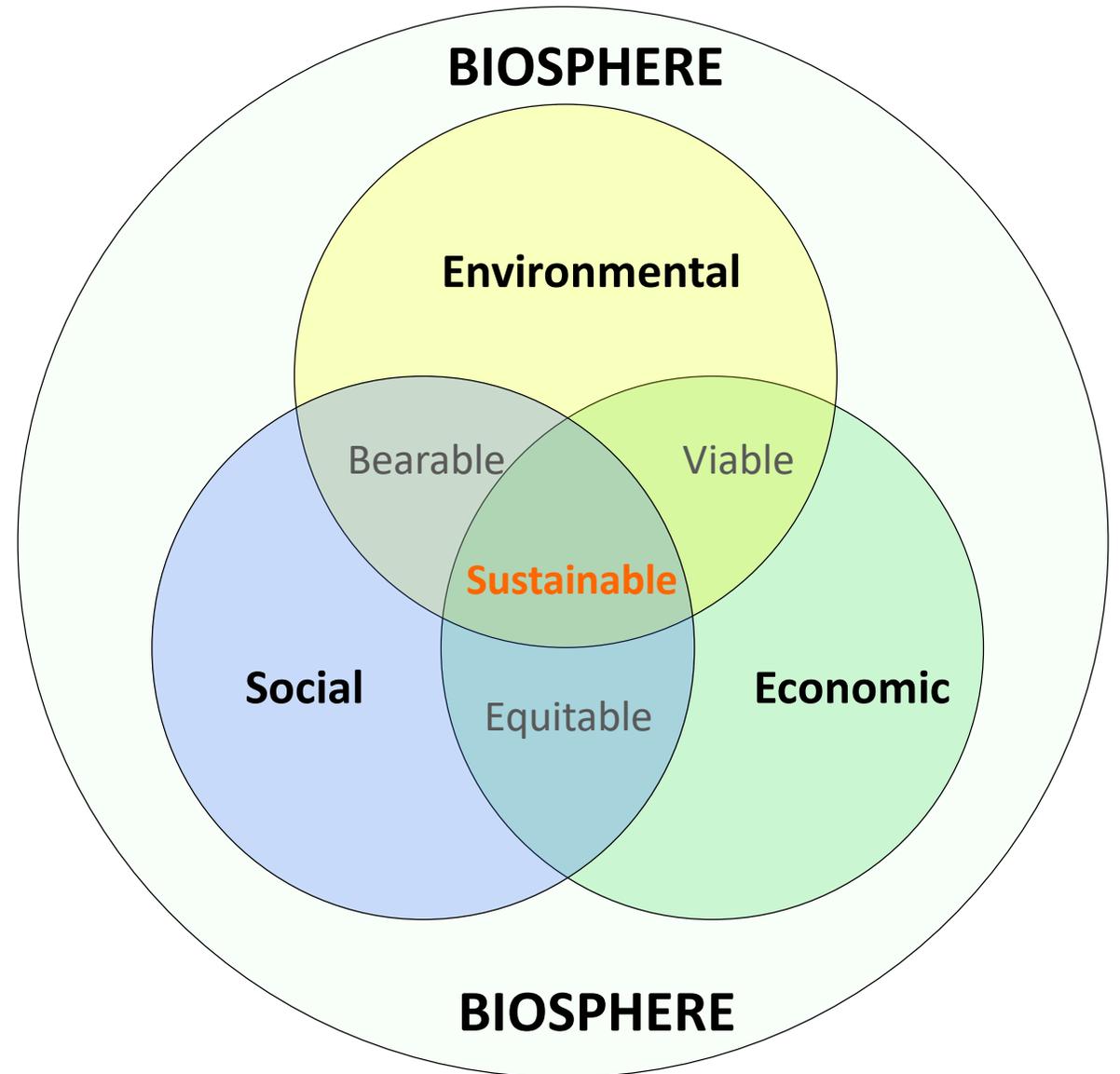
This session:

- Relationship of sustainability and health
- Role of the health sector in sustainability
- How we can make changes for sustainability in healthcare

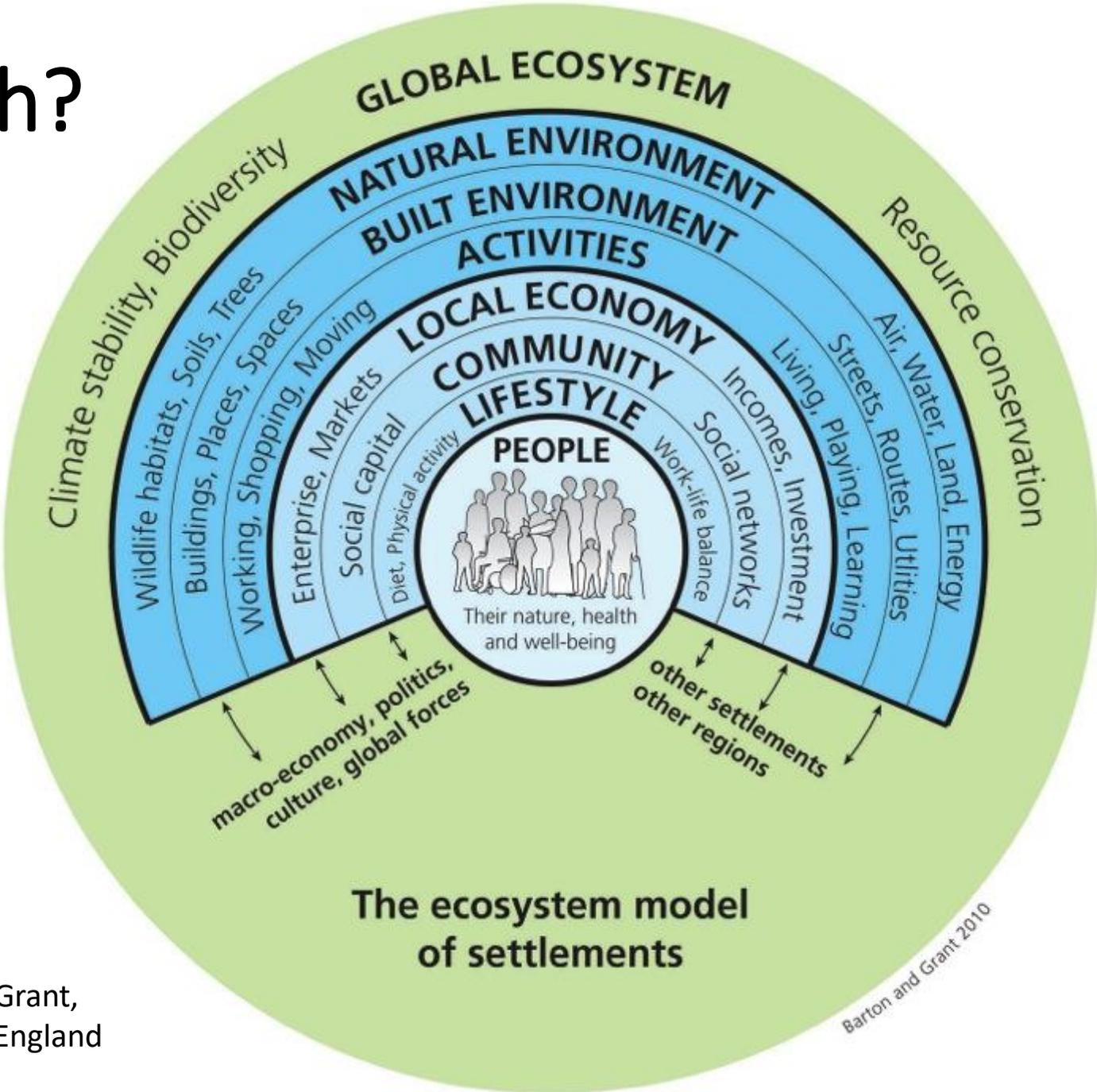
What is sustainability?

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

UN World Commission on Environment and Development



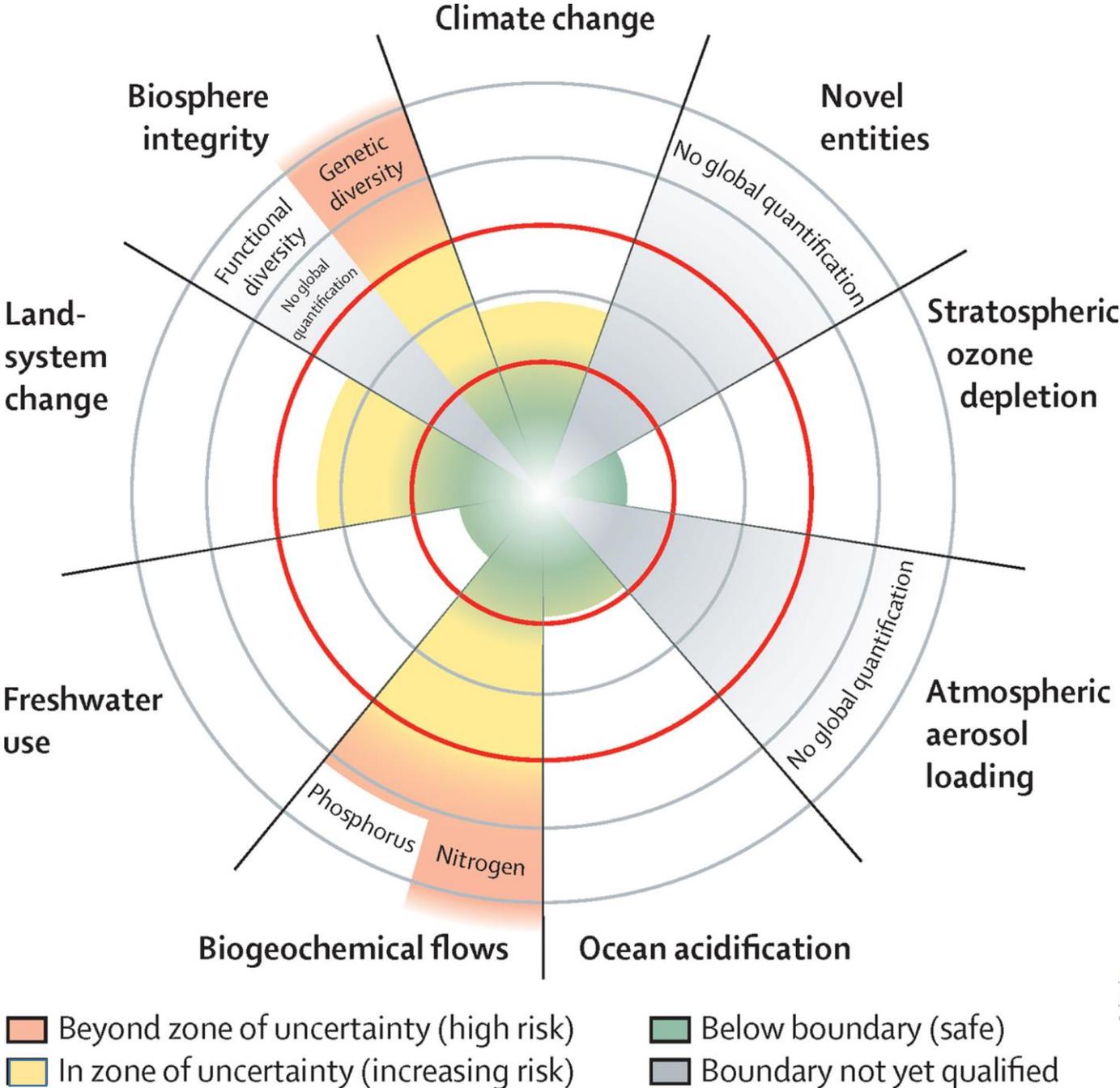
What is health?



Hugh Barton and Marcus Grant,
University of the West of England

The planetary boundaries framework presents nine boundaries within which humanity can continue to develop and thrive for generations

Steffen et al. 2015. Science





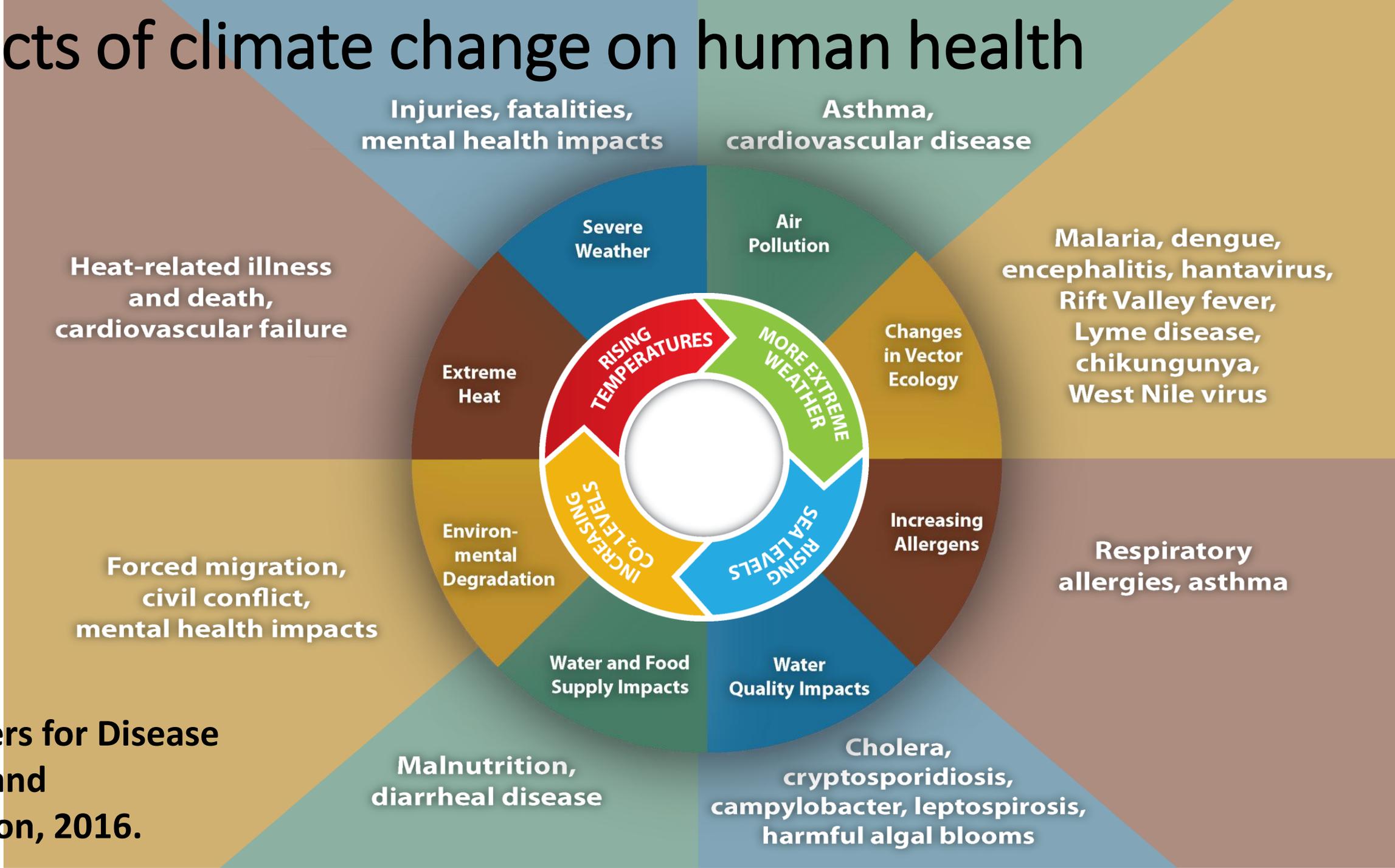
‘Although vector-borne diseases will expand their reach and death tolls, the indirect effects of climate change on water, food security, and extreme climatic events are likely to have the biggest effect on global health.’

Managing the health effects of climate change - Lancet & UCL, 2009

- *societal breakdown*
- *war*



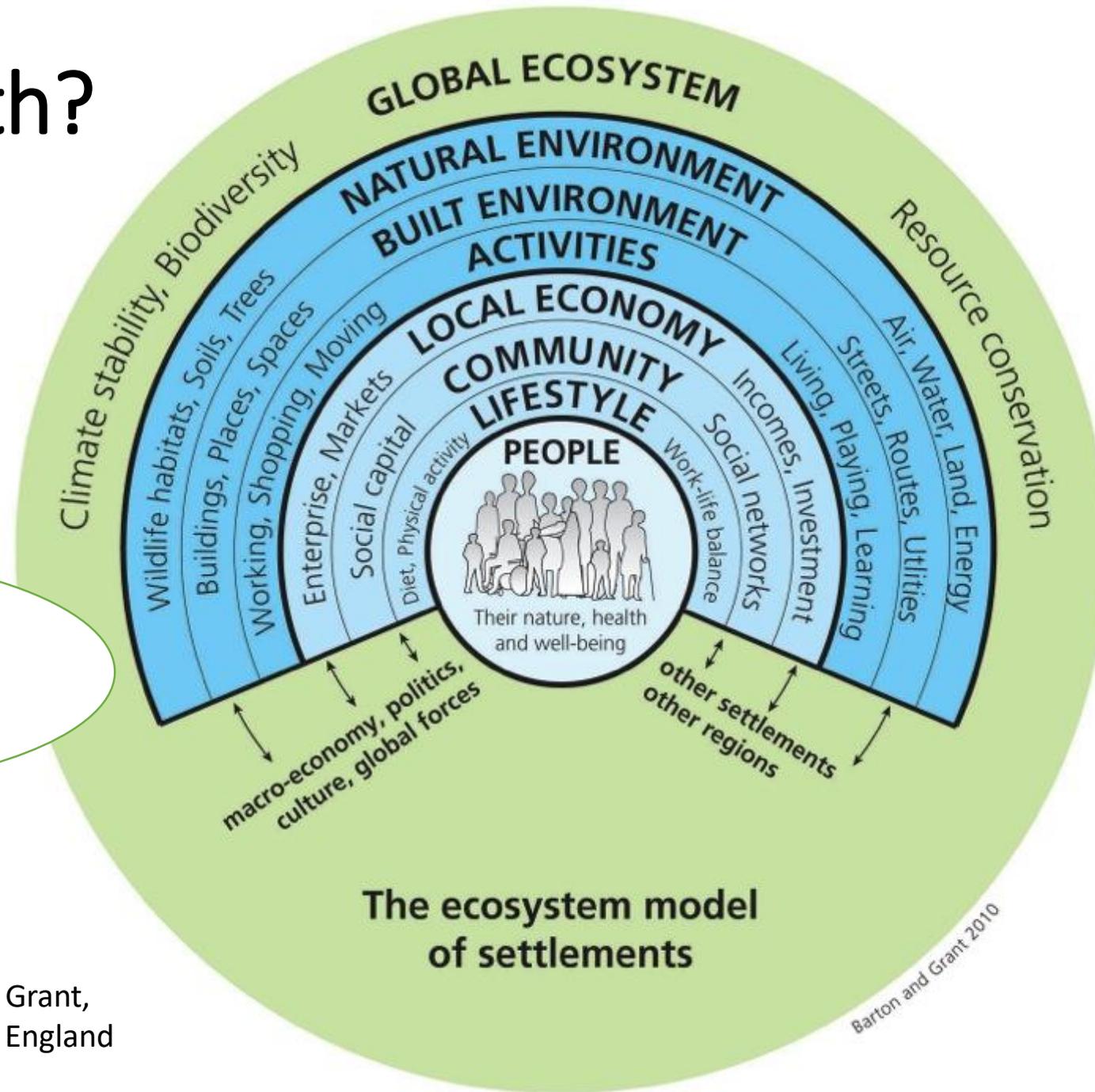
Impacts of climate change on human health



US Centers for Disease Control and Prevention, 2016.

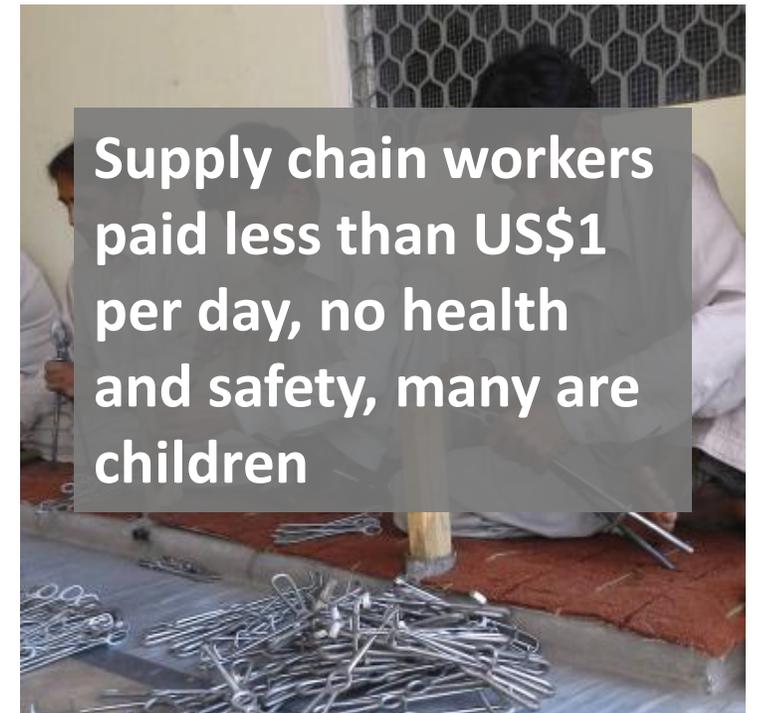
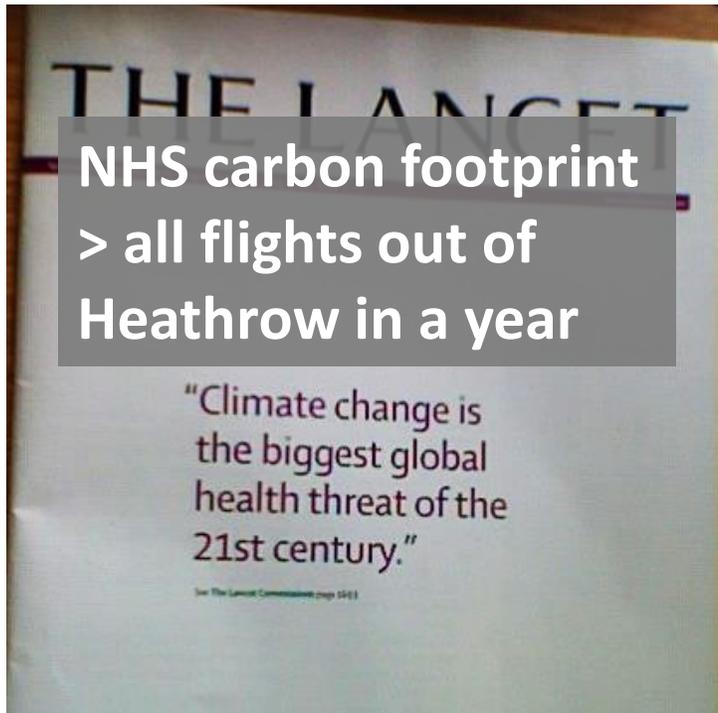
What is health?

What is the role of the health sector?



Hugh Barton and Marcus Grant,
University of the West of England

Do no harm



THE LANCET

June, 2015

www.thelancet.com

Health and climate change



"Tackling climate change could be the greatest global health opportunity of the 21st century."

A Commission by The Lancet

‘No regret’ policies will improve health, enhance resilience, alleviate poverty and address inequality:

- Clean energy
- Active travel
- Housing improvements
- Green spaces

Three min. film:

<http://www.thelancet.com/cms/attachment/2033405756/2049484881/mmc2.mp4>



How can we develop more sustainable healthcare?

1. Governance & accountability
2. Knowledge:
 - Data
 - Concepts
 - Examples on the ground
3. Culture: leadership, education, policy, networks

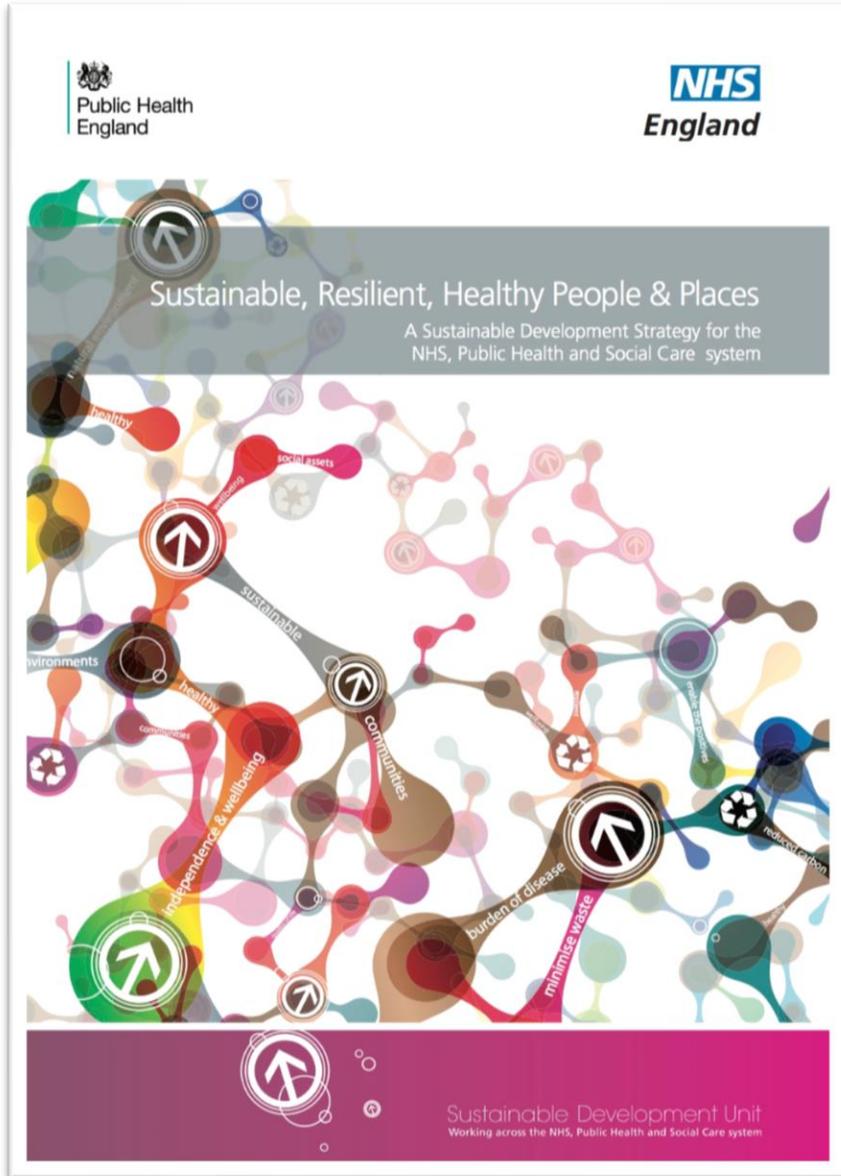
Governance & accountability

National legal drivers



- Climate Change Act (2008): *committed the UK to reduce its carbon footprint by 80% by 2050 and the NHS signed up to meet this target. The Act was amended in 2019 to commit to 100% reduction by 2050 (net zero).*
- Public Services or Social Value Act (2012): *All commissioners of public services are required to consider economic, social and environmental value, not just price, when procuring services.*
- Well-being of Future Generations Act (Wales, 2015)





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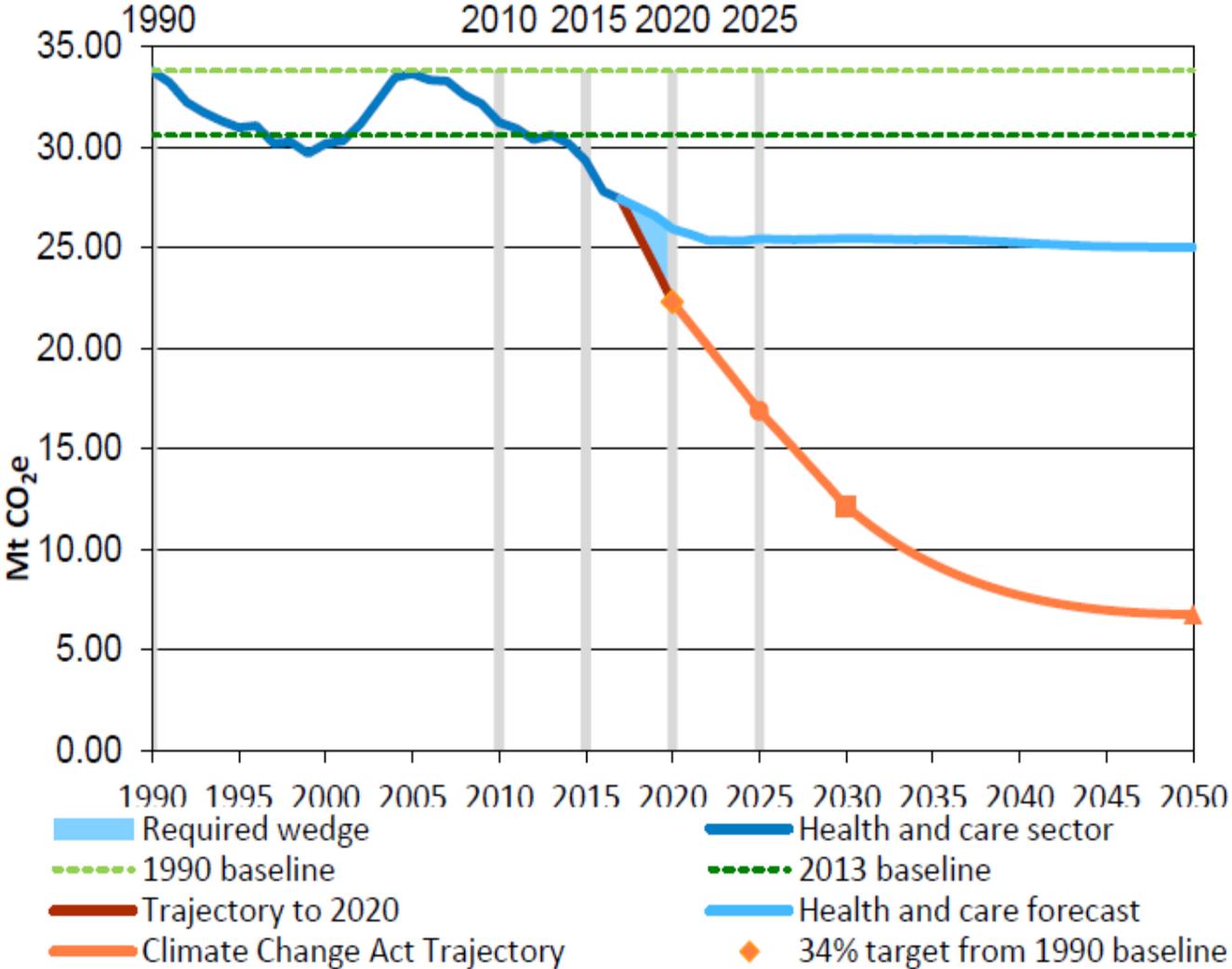
Est. 2008

“Our vision of sustainable health and care: A sustainable health and care system works within the available environmental and social resources protecting and improving **health now and for future generations.”**

- Reporting – adaptation, carbon footprint
- Engaging across the system
- Tools, policy, research

 Sustainable Development Unit

Figure 2. Health and Social Care in England Carbon Footprint (CO₂e baseline to 2050 with Climate Change targets)



Embedding drivers within the NHS

- **NHS Long Term Plan** reiterates carbon reduction commitments and identifies contributions from inhalers, anaesthetic gases

NHS Standard Contract

As part of its **Green Plan** the Provider must have in place clear, detailed plans as to how it will contribute towards a 'Green NHS' with regard to NHS Long Term Plan commitments in relation to: climate change, and **specifically how it will, by no later than 31 March 2021, take action:**

In accordance with Good Practice, to reduce the impacts from the use, or atmospheric release, of environmentally damaging fluorinated gases used as anaesthetic agents and as propellants in inhalers, including by appropriately **reducing the proportion of desflurane to sevoflurane used in surgery to less than 20% by volume**, through clinically appropriate **prescribing of lower greenhouse gas emitting inhalers**, and the **appropriate disposal of inhalers**



GP Contract

37. The NHS has committed to **reducing the carbon impact of inhalers** used in the treatment of respiratory conditions by 50%. These impacts are described in the [2019 BTS/SIGN Asthma guidelines](#) and by NICE in its 2019 [Shared Decision Aid on Asthma](#). **All inhaler prescriptions, Structured Medication Reviews or planned Asthma Reviews taking place in primary care should consider moving or facilitating patients to lower carbon options** where it is clinically appropriate to do so.

- *The scope is non-salbutamol inhalers (of which 51% are MDI currently)*
- *The target is to shift from 51% to 45% MDI in 20/21*

Governance (& tool): ~~SDMP~~ Green Plan



Plan (SDMP)

> SDMP examples

> Adaptation plan

> Trust & CCG joint SDMP

> Health Outcomes Travel Tool

Measure / Report

Evaluate (SDAT)

Engage

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New sustainable development management plan (SDMP) guide

The Sustainable Development Unit have worked with NHS Improvement to produce a new guide and resources to help organisations plan their sustainability work and deliver environment, social and financial value.

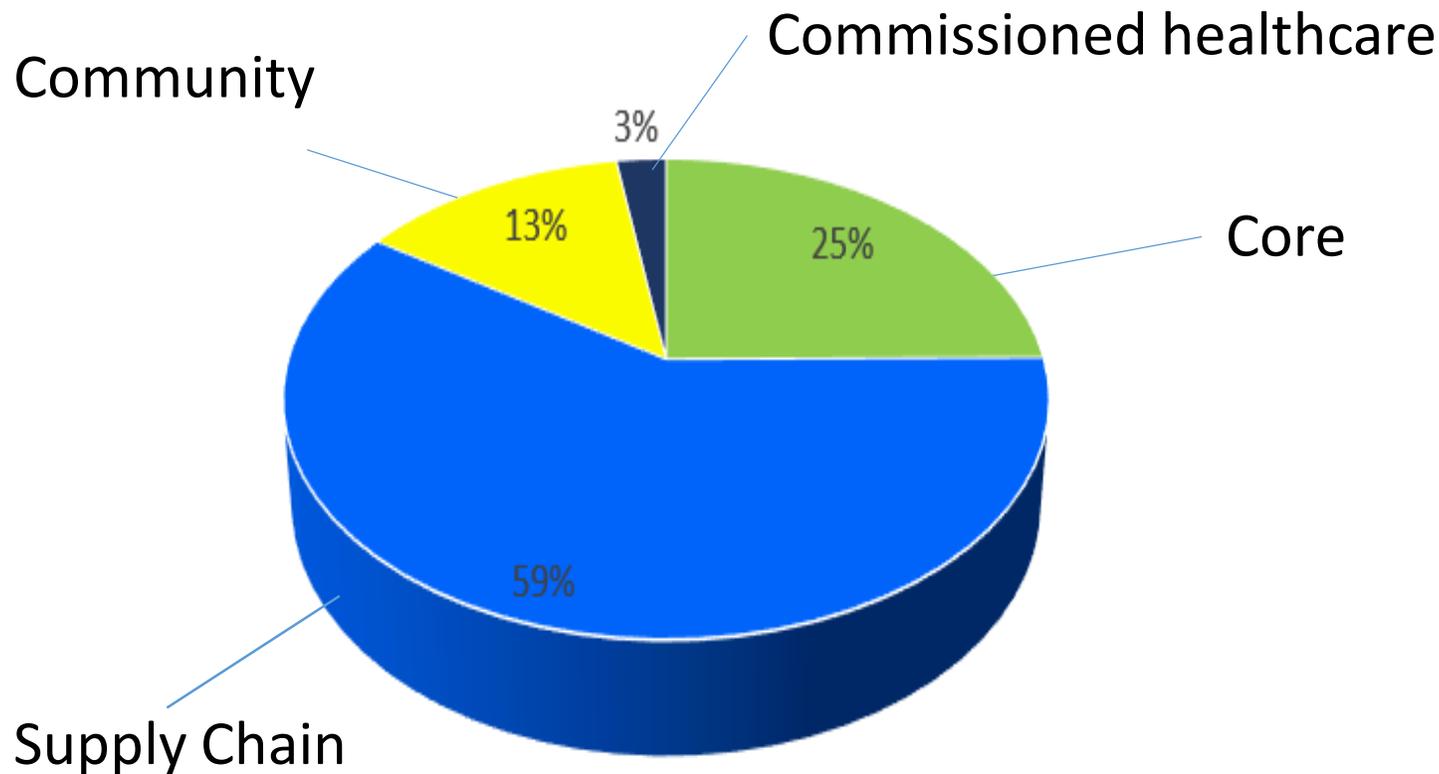
Jointly authored by the NHS Improvement sustainability team and the SDU the resources support organisations to produce their SDMP to address issues such as air pollution, energy use, greenspace, carbon emissions, climate

Knowledge

data, concepts, examples

Data

Carbon Footprint of NHS England – 21.54 MtCO₂e



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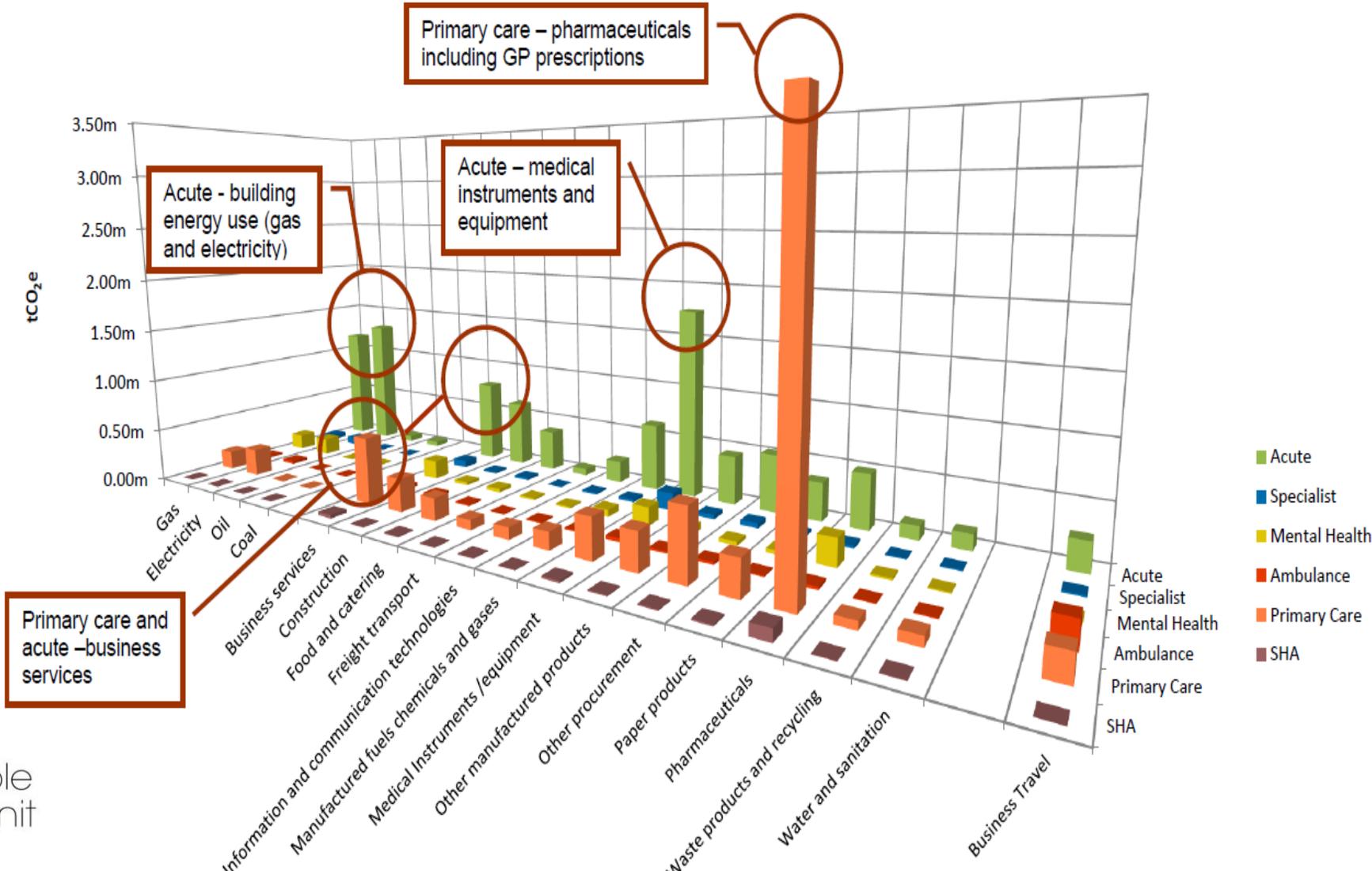
Core: NHS organisations have direct control over – energy, waste, water, anaesthetic gases, business travel/ fleet

Supply Chain: This has to do with the supply of goods and services

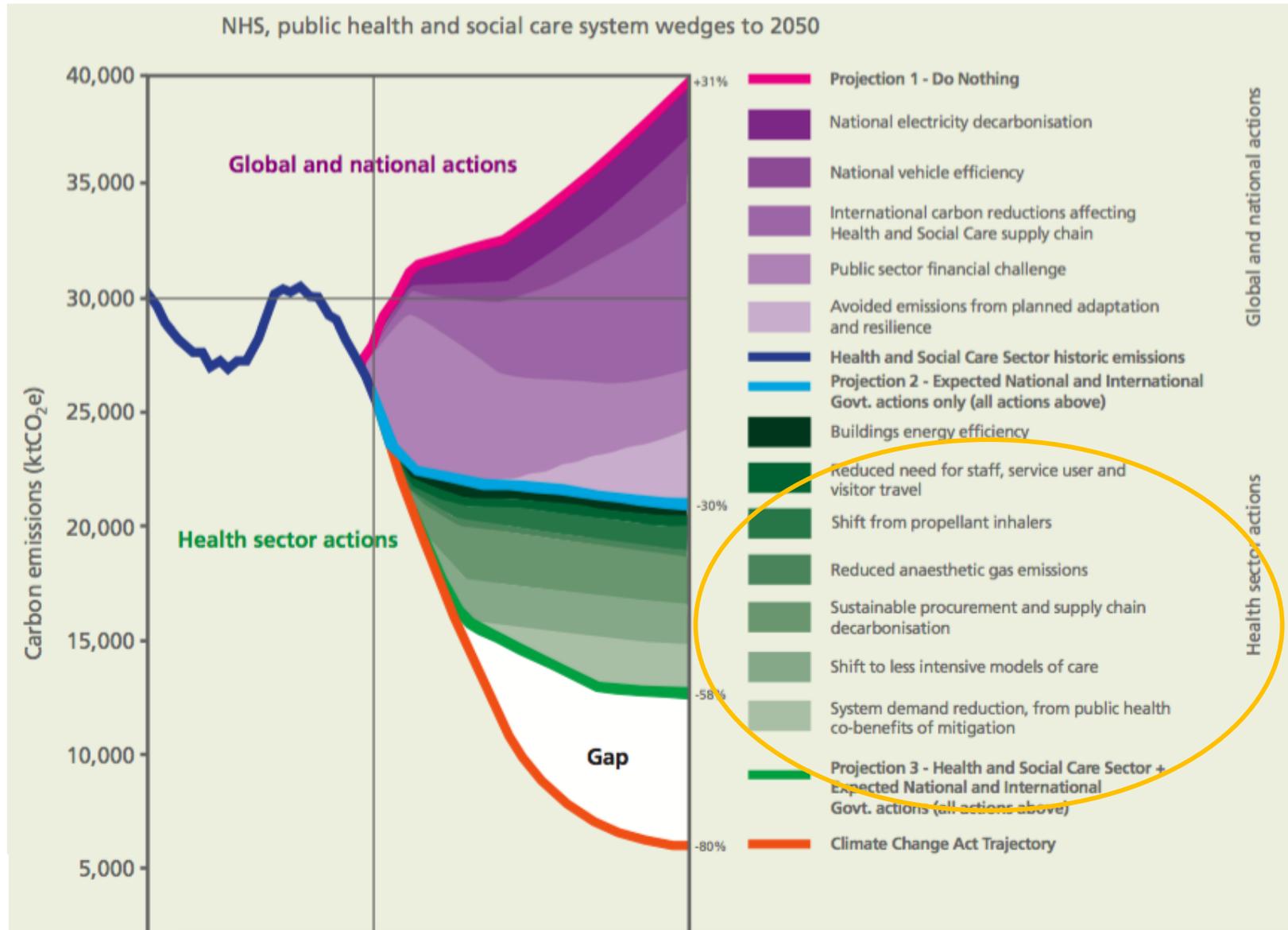
Community: Staff, patient and visitor travel, MDIs



Data: Carbon hotspots

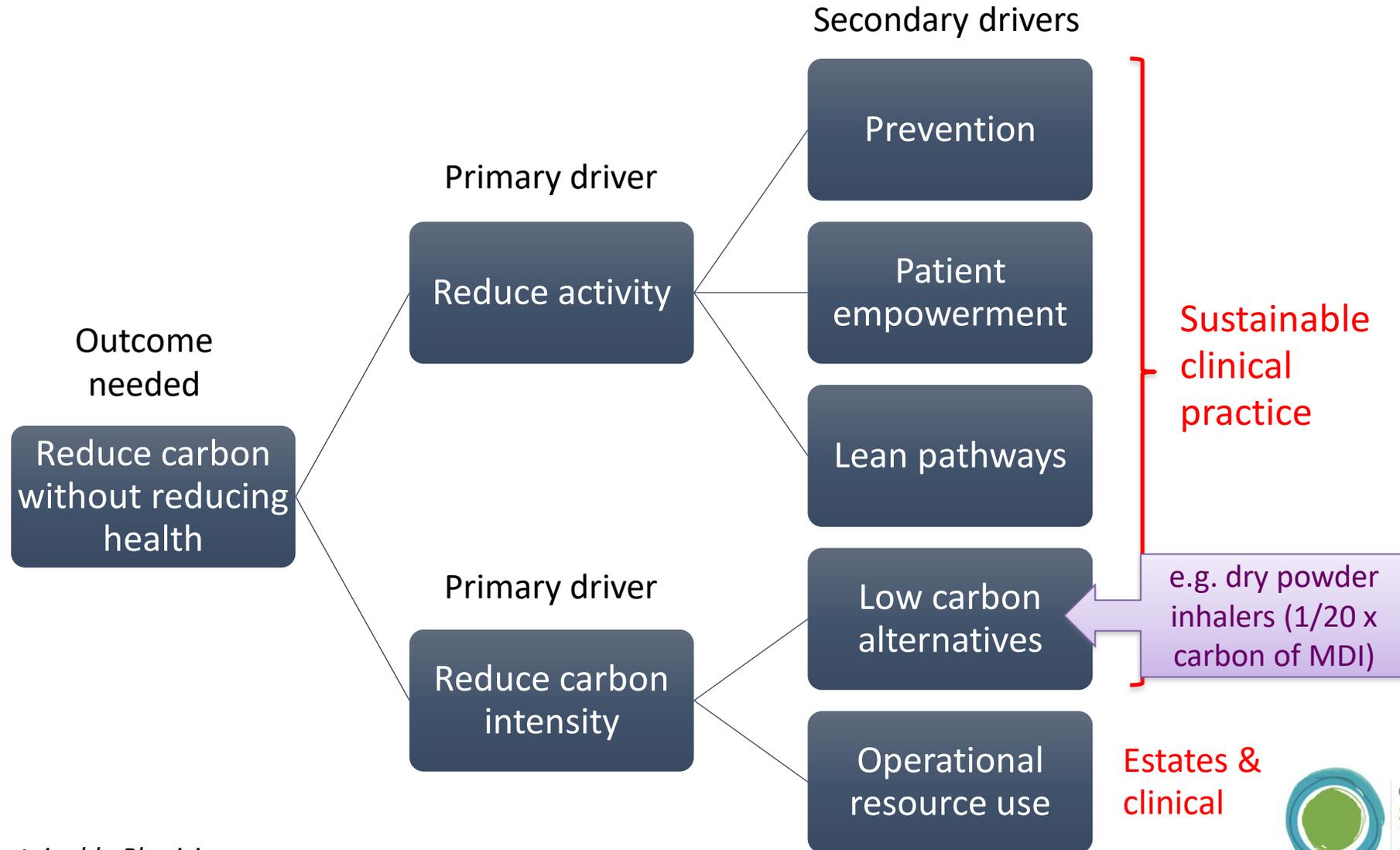


Data: Wedges - how will 80% carbon reduction be achieved?



Require clinical leadership

Concepts: Sustainable clinical practice



Concepts: sustainable value

$$\text{Value} = \frac{\text{Outcomes for patients and populations}}{\text{Environmental + social + financial impacts (the 'triple bottom line')}}$$

Mortimer et al., Future Healthcare Journal 2018, Vol 5, No 2: 88-93

Examples...



**GREEN WARD
COMPETITION**
CENTRE FOR SUSTAINABLE HEALTHCARE



Royal Cornwall Hospitals **NHS**
NHS Trust

Dartford and Gravesham **NHS**
NHS Trust

Ashford and St. Peter's Hospitals **NHS**
NHS Foundation Trust

University Hospital Southampton **NHS**
NHS Foundation Trust

NHS
Whittington Health
NHS Trust

University College **NHS**
London Hospitals
NHS Foundation Trust



Culture

*leadership, education, policy &
networks*



ANNABELLE COLLINS

The Ward Round: Is 'the best place to work' a pipe dream?

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Jackie Daniel: Why Newcastle FT has declared a "climate emergency"



By Dame Jackie Daniel | 8 August 2019



11 Comments



The Newcastle upon Tyne Hospitals Foundation Trust is the first NHS trust in the country to declare a climate emergency and has committed to work with its civic partners to become carbon neutral by 2040, notes Dame Jackie Daniel

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6



Top hospital chief executive

GMC Outcomes for Graduates 2018

25. Apply the methods of population health, health improvement and **sustainable healthcare** to medical practice
- f. Outline the principles underlying health service policy and clinical guidelines, including health economics, equity, and **sustainable healthcare**
 - h. evaluate the role of **ecological, environmental** and occupational hazards in ill-health and discuss ways to **mitigate** their effects



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Sustainable Healthcare Education



sustainable
healthcare
education

A network for all those interested in educating health professionals for planetary health: understanding the links between human health and the environment; developing skills for creating a sustainable health service.

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US medical student editorial on climate change in the curriculum

Post created 9 minutes ago in the [Sustainable Healthcare Education](#) network by [Stefi Barna](#)

Organisers



Members



<http://networks.sustainablehealthcare.org.uk>

Summary

- Sustainability is fundamental to health – and health is a foundation for sustainability
- Human activity threatens the sustainability of the global ecosystem
- The health sector is part of the problem, but is also part of the solution
- Changes are underway:
 1. Governance & accountability
 2. Knowledge (data, concepts, examples)
 3. Culture: leadership, education, policy, networks
- We have permission to Go Green and meet targets for Net Zero





Search

For a greener NHS

National ambition

Net Zero

Get involved

What's already happening



"While the NHS is already a world leader in sustainability, as the biggest employer in this country and comprising nearly a tenth of the UK economy, we're both part of the problem and part of the solution.

"Indeed if health services across the world were their own country, they'd be the fifth-largest emitter on the planet.

"That's why we are mobilising our 1.3 million staff to take action for a greener NHS, and it's why we'll be working with the world's leading experts to help set a practical, evidence-based and ambitious route map and date for the NHS to reach net zero."

Sir Simon Stevens, NHS Chief Executive.

