Sustainability in quality improvement

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Medical Director, Centre for Sustainable Healthcare, Oxford
February 2017

Sustainability in Quality Improvement training materials, developed by the Centre for Sustainable Healthcare with grant funding from North Bristol NHS Trust.
Aims – you should be able to:

1. Recognise sustainability as a domain of quality in healthcare and discuss its relationship to other domains.

2. Review the environmental, social and economic inputs to a given health system, and identify relevant carbon hotspots.

3. Apply the principles of sustainable clinical practice in the design of a QI intervention.

4. Identify outcome and activity measures in order to evaluate impact on sustainability / sustainable value.
“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

But quality is not enough - we need to improve value
Sustainability in quality improvement: redefining value

Authors: Frances Mortimer, Jennifer Isherwood, Alexander Wilkinson and Emma Vaux

Value = Outcomes for patients and populations
        Environmental + social + financial impacts
        (the 'triple bottom line')
Sustainability in QI: redefining value

**Technical value**
Are the right patients being seen or is there either:
- harm from diagnosis
- inequity from underuse

**Efficiency**
Outcomes/resources

**Productivity**
Outputs/resources

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. Offax press.
The SusQI framework
Table 1 Benefits of building sustainability into quality improvement

<table>
<thead>
<tr>
<th>QI element</th>
<th>Sustainability content</th>
<th>Benefits</th>
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<td>Triple bottom line/ sustainable value equation; measuring carbon</td>
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</tbody>
</table>
Setting QI goals

Including sustainability within your project aims (how will this affect engagement with colleagues and wider stakeholders?)
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.”
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Studying the system

Understanding environmental and social resource use and impacts
Carbon hotspots

Primary care – pharmaceuticals including GP prescriptions

Acute - building energy use (gas and electricity)

Acute – medical instruments and equipment

Primary care and acute - business services
Social impacts – on whom?

- Patient
- Staff
- Carers
- Dependants
- Local community
- Distant communities (e.g. supply chain workers)
Social impacts on distant communities

“Labourers in surgical instrument manufacture are often paid less than US$1 per day, have poor job security, have woefully inadequate protection of health and safety, and many employees are children, some as young as seven years old.”

BMA Medical Fair & Ethical Trade Group
The ecosystem model of settlements

Bardon and Grier 2010
Social sustainability

• Basic needs, including housing and environmental health
• Education and skills
• Employment
• Equity
• Human rights and gender
• Poverty
• Social justice
• Demographic change (ageing, migration and mobility)
• Social mixing and cohesion
• Identity, sense of place and culture
• Empowerment, participation and access
• Health and Safety
• Social capital*
• Wellbeing, Happiness and Quality of Life

*defined as “networks together with shared norms, values and understandings that facilitate co-operation within or among groups” (OECD)

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Designing your QI intervention

Applying the principles of sustainable clinical practice
How will 80% carbon reduction be achieved?
Sustainable clinical practice: principles

- Primary driver
  - Reduce activity
  - Reduce carbon intensity

Secondary drivers
- Reduce carbon without reducing health
- Outcome needed

Mortimer-F. The Sustainable Physician
Sustainable clinical practice: principles

- Reduce activity
  - Primary driver
  - Secondary drivers
    - Prevention
    - Self care
    - Lean pathways

- Reduce carbon intensity
  - Primary driver
  - Reduce carbon without reducing health
  - Outcome needed
Sustainable clinical practice: principles

- Reduce carbon without reducing health
  - Reduction activity
  - Reduce carbon intensity

Primary driver

Secondary drivers
- Prevention
- Self care
- Lean pathways
- Low carbon alternatives
- Sustainable estates

Outcome needed

Improve sustainability of respiratory inhaler prescribing

1. Prevent avoidable respiratory disease
   - Reduce smoking
   - Reduce cold/mould exposure
   - Reduce air pollutant exposure
   - Review referral rates to smoking cessation service
   - Investigate housing improvement referral scheme

2. Empower patients to improve disease management
   - Co-production
   - Social prescribing
   - Lean communications
   - Singing/ pulmonary rehab referral forms
   - Rescue packs for acute exacerbations

3. Ensure lean prescribing and dispensing systems
   - High value prescribing
   - Introduce paperless prescribing/ repeat requests
   - Introduce annual inhaler reviews
   - Update prescribing guidelines
   - Write article for local GP newsletter

4. Switch to lower carbon alternatives
   - Preferential use of DPI vs MDI inhalers
   - Preferential use of DPI vs MDI inhalers
   - Update prescribing guidelines
   - Write article for local GP newsletter

5. Improve operational resource use
   - Renewable energy
   - Waste recycling
   - Relevant actions
   - Review referral rates to smoking cessation service
   - Investigate housing improvement referral scheme
   - Input to local transport policy
   - Confirm patients receive air quality health advice
   - Ensure yearly care planning
Lean systems... spotting waste

• Out of date stock
• Single use items
• Cancellation
• Packaging
• Standby
• Non compliance
• Waiting time
• Commuting time
• ...can you add 2 more euphemisms for waste?
Your service - sustainable clinical practice

<table>
<thead>
<tr>
<th>Principle</th>
<th>Opportunities?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prevention</td>
<td></td>
</tr>
<tr>
<td>2. Patient empowerment and self care</td>
<td></td>
</tr>
<tr>
<td>3. Lean systems</td>
<td></td>
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<tr>
<td>4. Low carbon alternatives</td>
<td></td>
</tr>
</tbody>
</table>
Your service – overuse/underuse

<table>
<thead>
<tr>
<th>Type of waste</th>
<th>Opportunities?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overuse of low value interventions</td>
<td></td>
</tr>
<tr>
<td>Underuse of high value interventions</td>
<td></td>
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</tbody>
</table>
## Your service - sustainable resource use

<table>
<thead>
<tr>
<th>Resource use</th>
<th>Opportunities?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td></td>
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<tr>
<td>Travel (staff, patients)</td>
<td></td>
</tr>
<tr>
<td>Medical supplies</td>
<td></td>
</tr>
<tr>
<td>Non-medical supplies</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td></td>
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</tbody>
</table>
Prioritise

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Impact (1-3)</th>
<th>Feasibility (1-3)</th>
</tr>
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<td></td>
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Measuring environmental and social costs/impacts
Sustainability in quality improvement: redefining value

Authors: Frances Mortimer, Jennifer Isherwood, Alexander Wilkinson and Emma Vaux

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

Carbon footprint - the sum of greenhouse gas emissions released in relation to an organisation, product or service, expressed as carbon dioxide equivalents (CO$_2$e).
Carbon footprint: what is included?
(operational boundaries)

**Scope 1:**
Direct emissions
- Energy generation
- Vehicle emissions
- HFCs, N₂O, etc.

**Scope 2:**
Indirect emissions (electricity)
- Electricity use

**Scope 3:**
Indirect emissions (other)
- Supply chain
- Travel
- Waste disposal
Methods

Top down
input-output

Emissions factors applied to spend in different economic sectors

Hybrid

Bottom up
process-based

Emissions factors applied to components of a process or product, e.g. materials, energy use
### Greenhouse gas emissions factors – UK Govt

#### Table: Greenhouse gas emissions factors for cars

<table>
<thead>
<tr>
<th>Activity</th>
<th>Type</th>
<th>Unit</th>
<th>kg CO₂</th>
<th>kg CH₄</th>
<th>kg N₂O</th>
<th>kg CO₂</th>
<th>kg CH₄</th>
<th>kg N₂O</th>
<th>kg CO₂</th>
<th>kg CH₄</th>
<th>kg N₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small car</td>
<td>km</td>
<td>0.14</td>
<td>0.14</td>
<td>0.0006</td>
<td>0.0077</td>
<td>0.1601</td>
<td>0.1199</td>
<td>0.0034</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium car</td>
<td>miles</td>
<td>0.28</td>
<td>0.23</td>
<td>0.0008</td>
<td>0.0024</td>
<td>0.2147</td>
<td>0.1273</td>
<td>0.0032</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large car</td>
<td>miles</td>
<td>0.28</td>
<td>0.23</td>
<td>0.0008</td>
<td>0.0024</td>
<td>0.2147</td>
<td>0.1273</td>
<td>0.0032</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average car</td>
<td>miles</td>
<td>0.28</td>
<td>0.23</td>
<td>0.0008</td>
<td>0.0024</td>
<td>0.2147</td>
<td>0.1273</td>
<td>0.0032</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 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 DUCA 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 then be applied which will give a more accurate view of the actual emissions from the vehicle (the conversion factor for vehicle mileage represents the average mpg of the whole UK vehicle population, while the actual mpg and using this value will yield more precise results).

**I know the average CO₂/km of my passenger vehicles as well as mileage; can this be used to improve my calculations?**

If you know the manufacturers’ CO₂/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 [DCF](http://www.ukconversionfactorscarbonsmart.co.uk/).
Mental Health services characteristics

<table>
<thead>
<tr>
<th>Mental Health Sector</th>
<th>Source</th>
<th>Unit</th>
<th>Value</th>
<th>Goods and services</th>
<th>Building energy use</th>
<th>Travel (business only)</th>
<th>Commissioned activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of organisations</td>
<td>HEFS 2010/11</td>
<td></td>
<td>54</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating expenditure</td>
<td>AC 2009/10</td>
<td>£</td>
<td>8.3b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-pay spend</td>
<td>modelled</td>
<td>£</td>
<td>3.5b</td>
<td></td>
<td>2,249m</td>
<td>74m</td>
<td>12m</td>
</tr>
<tr>
<td>Carbon footprint NHS England</td>
<td>modelled</td>
<td>tCO2e</td>
<td>1.47m</td>
<td>0.87m</td>
<td>0.32m</td>
<td>0.01m</td>
<td>0.26m</td>
</tr>
<tr>
<td>Average Carbon footprint per organisation</td>
<td>modelled</td>
<td>tCO2e</td>
<td>27,144</td>
<td>16,059</td>
<td>5,965</td>
<td>247</td>
<td>4,873</td>
</tr>
<tr>
<td>Carbon intensity based on total income</td>
<td>modelled</td>
<td>kgCO2e/£</td>
<td>0.18</td>
<td>0.10</td>
<td>0.04</td>
<td>0.0</td>
<td>0.03</td>
</tr>
<tr>
<td>Carbon intensity based on total non-pay spend</td>
<td>modelled</td>
<td>kgCO2e/£</td>
<td>0.42</td>
<td>0.25</td>
<td>0.09</td>
<td>0.0</td>
<td>0.08</td>
</tr>
<tr>
<td>Carbon intensity of category</td>
<td>modelled</td>
<td>kgCO2e/£</td>
<td>0.42</td>
<td>0.39</td>
<td>4.38</td>
<td>1.13</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Patient activity – inpatient admissions      | CHE RP 76   | admissions | 151,116 |
|                                              | 2009/10     |            |         |

Patient activity – outpatient attendances     | CHE RP 76   | attendances | 23,44m |
|                                              | 2009/10     |            |         |

Carbon footprint per inpatient admission      | modelled    | kgCO2e    | 476    | 281     | 105     | 4        | 85        |
Carbon footprint per bedday                   | modelled    | kgCO2e    | 97     | 58      | 11      | 1        | 17        |
Carbon footprint per outpatient appointment   | modelled    | kgCO2e    | 59     | 35      | 13      | 1        | 11        |
Carbon by units of healthcare activity

Care Pathways Guidance on Appraising Sustainability (SDU, 2015)

GP visit x5 + ED visit x2 + Surgery x2 + Bed day x6 = Care pathway
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.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Outcome</th>
<th>£’s</th>
<th>CO₂e</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra GP consult</td>
<td>[delay to surgery]</td>
<td>£45(^1)</td>
<td>18 kg(^2)</td>
<td>Patient &amp; carer time/ stress</td>
</tr>
</tbody>
</table>
| 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

Charlie Kenward, Severn GP ST3 Sustainability Scholar 2014-15
Measuring social impacts?

<table>
<thead>
<tr>
<th></th>
<th>Patients</th>
<th>Carers</th>
<th>Community</th>
<th>Supply chain</th>
<th>Staff</th>
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<tbody>
<tr>
<td>Housing</td>
<td></td>
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<td>Poverty</td>
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<tr>
<td>Health</td>
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<td>Education</td>
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<td>Employment</td>
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<td>Safety/security</td>
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<td>Satisfaction</td>
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<tr>
<td>Participation</td>
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<tr>
<td>Social gradient</td>
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Can you identify outcome and activity measures to evaluate sustainability impact of...?

• Introducing one-stop service, e.g.
  • Breast lump assessment
  • Peripheral vascular disease
  • Back pain

• Integrating preventative services, e.g.
  • Vascular clinic – smoking cessation etc
  • Gallstones pathway - dietetics

• Overnight > day case surgery, e.g.
  • Laparoscopic cholecystectomy
  • Robotic prostatectomy
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
Resources

“Sustainability in Quality Improvement: Redefining Value”

“Sustainability in Quality Improvement: Measuring Impact”

SusQI open access learning resources:
http://networks.sustainablehealthcare.org.uk/sus-qi-resources

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http://sustainablehealthcare.org.uk
frances.mortimer@sustainablehealthcare.org.uk