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## National Workshop - Carbon Modelling within Dentistry

## Royal College of Anaesthetists, Churchill House,

## 35 Red Lion Square, London WC1R 4SG

## The aim of the workshop was to explore the feasibility of carbon mapping common dental procedures.

The following workshop outcomes were considered and, we hope, achieved;

1. For dental leaders including dental informatics: to understand the carbon modelling agenda.
2. For carbon modelling experts: to understand the dental process, in order to understand how each item could be modelled.
3. For researchers: to understand the state of current knowledge and the opportunities for research in this area.
4. For industry: to contribute expertise on supply chain processes and understand what will be required of their products in the future.

The day started with a look at sustainable healthcare and the role and responsibility in mitigating climate change, presented by Rachel Stancliffe from CSH, and an overview of PH/ NHS dentistry given by Brett Duane, PHE.

It was followed by a presentation by Frances Mortimer from CSH summarizing the different carbon footprinting models, their different purposes and methods. Thereafter a couple of case studies were presented. Craig Simmons from Anthesis gave a presentation of their GP carbon footprinter, whereas Tom Penny from ERM talked about their work with the SDU on carbon footprinting distinct modules within a clinical care pathway. Kim Croasdale from NUS showed us how dentists can be engaged in improving the sustainability of their practices by being involved in the NUS’ Green Impact Programme.

Following on Brett Duane, PHE, showed what data are available within dental services which will support the calculation of a carbon footprint and he talked about his carbon footprinting study in Scotland.

Mike Berners-Lee from small world consulting concluded the morning by presenting the advantages and disadvantages of a bottom up process based life cycle approach versus a top down environmental input-output method and how these two methods can be combined to approach some accuracy in calculating a carbon footprint.

**Key messages from each presentation:**

**Introduction to sustainable healthcare** *– Rachel Stancliffe, CSH*

Sustainable healthcare can help to address rising demand and with it rising health costs. It facilitates reducing waste and mitigating climate change by reducing carbon emissions. It also assists in tackling health inequality and patient experience.

This is what sustainable healthcare looks like

Sustainable clinical practice

## Overview of PH dentistry *– Brett Duane, PHE*

## Oral health and dental care is provided by:

## NHS Primary Care Dental Services (e.g. GDS / PDS)

## Hospital Dental Service / Secondary Care

## Public Dental Service/Commissioned Dental Services

## Dental Public Health services (oral health promotion and epidemiology)

## Private Dentistry

## For carbon modelling dental procedures the following data will be important:

## Scotland: All items recorded on GP17s sent to NHS Scotland

## England: Most common volumes of activity reported through FP17s to NHS Business Services Authority. The activities are reported per band and by general activity.

*Additional Notes:*

* Secondary care is less well coded
* Private dentistry: some data might be available via dental insurers, Henry Scheins’ software of excellence has comprehensive data on procedures of each individual patient.
* Procurement: Dental teams procure from different suppliers.
* Activity: is not recorded in the same way.
* Energy: a lot of the energy use is in hospitals (secondary care).

**Background on carbon counting** *– Frances Mortimer, CSH*

Why measure carbon – how does it help?

1. Policy development: setting targets, tracking progress
2. Service redesign: identifying carbon hotspots, evaluating innovations
3. Comparing higher and lower carbon interventions and products
4. Engaging public, staff, suppliers /providers

Carbon footprint: what is included?

* **Scope 3** Indirect emissions (other): Supply chain, travel, waste
* **Scope 2** Indirect emissions (other): Electricity uses
* **Scope 1** Direct emissions: Energy generation, vehicle emissions, HFCs, N2O, etc.

Steps involved in carbon footprinting:

1. Define the goal and scope of the study
2. Identify the resources used (*set boundaries*, *create inventory*)
3. Measure the resource utilisation (*collect data*)
4. Attribute a carbon cost or footprint to the resources used (*x carbon intensity)*

**Using the GP Footprint Reporter - the approach to in-surgery carbon data collection used by the Royal College of General Practitioners** *- Craig Simmons, Anthesis*

## The GP Footprint Reporter was tailored to allow GP surgeries to capture their carbon footprint, without requiring complex data gathering processes.

## GP Footprint Reporter covers 6 categories: Business travel, Commuting, Patient travel, Utilities, Renewables, Supply Chain. These categories were based upon Defra’s Corporate Greenhouse Gas Reporting Guidelines and focus upon key areas of GHG emissions for a GP surgery, including both those within its direct control, and those that it can influence.

GP Footprint Reporter provides simple ‘drag and drop’ graphical user interface, instant analysis and reporting, examinations of future scenarios, benchmarking against other surgeries .

*Additional Note:* Anthesis handed the GP carbon footprinter over to RCGPs, so they do not have any data how many GPs are using it and what the carbon footprint of GPs looks like (average, range).

**GHG accounting approaches for healthcare products and pathways *-*** *Tom Penny, ERM*

Principles of the approach:

* Care pathways broken into modules(expendable over time)
* Detailed guidance on modules and provide information for combining modules into care pathway
* Each module includes definitions, activities, flow diagram, reference unit, example data and calculations
* Example calculations to appraise sustainability metrics (*more to be added over time*)
* Additional note: Used hospital cost data for procurement of pharmaceuticals. Identified the 20 most common prescribed. Will do more detailed research on these.

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**Green Impact in dental practices** *– Kim Croasdale, NUS*

The Green Impact Programme is a sustainability accreditation scheme, gives people simple, straightforward actions to make themselves and their workplace more sustainable and environmentally-friendly and rewards people for their efforts and hard work.

Example of a dentistry-specific Green Impactaction: *“The practice has a policy to implement the Minamata Convention on the phase-down of amalgam and relevant staff have been trained on this.”*

Over 40 dental practices and 483 staff directly involved, 2055 actions completed (836 as a result of the scheme) and an estimated 52 tonnes CO2and over £8,000from staff and patients switching off lights\*saved.

**Brief presentation on dental data** *– Brett Duane, PHE*

* English activity data on FP17: patient charges per band, procedures presented as percentage per band

Weakness: several activities in one band

* Scottish activity data on GP17: more detailed number of claims per activity, overall costs per claim
* Travel data: postcode of each patient, can calculate distance to practice, ‘allocate’ mode of transport, calculate carbon footprint

Weakness: conversion factor from how the crow flies distance to actual distance, mode of transport ‘assumed’ according to travel survey

O**verview of carbon modelling: how to combine approaches** *– Mike Berners-Lee, small world consulting*

Process based life cycle analysis

* Bottom up: On your hands and knees groping around
* Hard work
* Different assumptions yield different results
* Always has arbitrary boundaries
* Hard to know the significance of omissions
* Tends to underestimate
* Accuracy often over stated.
* Has potential for specificity but in reality ends up relying on generic datasets
* *Can* be powerful for identifying specific hot-spots in a supply chain.
* Inferences can also be made about other similar supply chains.
* Requires huge resources to do properly.
* PAS 2050 is a standard for Process based life cycle analysis of products

Input-Output analysis

* Looks at the whole economy divided into industry sectors.
* Demand for products stimulates output across the economy….
* …. causing both direct and indirect emissions…
* …. the ripple effects are endless…
* … but can be modelled as a complete system… …without systematic underestimation
* Easier – based on financial data
* Deals with complete systems
* Makes huge generalisations
* Reliant on national datasets

Hybrid methodology – an example

* Standard conversion factors for energy use (PLCA based)
* Input Output Analysis for initial understanding of supply chains
* PLCA for to improve understanding of hot-spots

How to go about carbon modelling

* Clarify purpose
  + What decisions are you trying to inform?
  + What perspective are you trying to bring?
* Define scope and boundaries
* What data can you get hold of – and how easily?
* How much resource do you have?
* How much ‘accuracy’ is possible?
* How much ‘accuracy’ do you need?
* Plan a method to achieve your objectives, within the constraints – optimising trade-offs.

*Additional notes:*

* PA2050 states that you cannot compare between products (unless they had the same truncation error);
* What could be done for dentistry: take one procurement item and break it down to tiers, compare to pharmaceuticals.

**After lunch discussion**

PHE is working with CSH on carbon modelling 20 dental procedures. In the context of the morning the following questions were raised:

* Can we clarify the decisions we want to inform this first project in dentistry carbon modelling?
* What are the scope and boundaries for the project? Are we looking at longevity – oral well being instead of ‘just’ treatments? Ie is the project to inform to better PH dentistry?
* There seems to be a lack of data of effectiveness or preventive interventions. -> Sandra has access to a national database which might help.
* Look at evidence-based medicine (EBM) and cost for process of choosing: top five dental procedures, how to change, delivering better oral health
* How is the impact of treatments on oral health measured? On what evidence does NICE make recommendations for dentistry? Do they use QALYs to judge cost-effectiveness? Nice struggle too, as QALYS are not a good measurement for dental treatment.
* Guidance is given to dentists to ‘deliver’ oral health.
* How do we gain support and achieve behaviour change, normalise sustainability? Can the BDA offer support?

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