Sustainable Dentistry: How-to Guide for Dental Practices Sustainable Dentistry How to Guide for Dental Practices Sustainable Dentistry: How-to Guide for Dental Practices

Book · January 2019

CITATIONS
0

READS
1,422

4 authors, including:

Sara Harford
University of Bristol
15 PUBLICATIONS **52** CITATIONS
SEE PROFILE

Darshini Ramasubbu
Trinity College Dublin
13 PUBLICATIONS **59** CITATIONS
SEE PROFILE

Brett Duane
Trinity College Dublin
69 PUBLICATIONS **265** CITATIONS
SEE PROFILE

Sustainable Dentistry

How to Guide for Dental Practices

Authors:
Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer,
Centre for Sustainable Healthcare (2018)

CENTRE FOR SUSTAINABLE HEALTHCARE
Cranbrook House 287-291 Banbury Road Oxford OX2 7JQ
T: +44 (0)1865 515811
www.sustainablehealthcare.org.uk

Contents Page

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Introduction

The fundamentals of human health and survival are under threat from global environmental change brought about by human activities. Every sector has its part to play in responding to this global emergency, and the FDI World Dental Federation has said that:

"Dentistry as a profession should integrate sustainable development goals into daily practice and support a shift to a green economy in the pursuit of healthy lives and well-being for all through all stages of life."

But what does this mean in practice, and how should dental teams go about it?

This Guide is intended as a practical resource for dental teams wishing take action to make their practice more sustainable. Teams can download the document in full, or can pick and mix from the individual "How to" mini-guides within each section.

The Guide has been developed with funding from Health Education England and accompanies and references a series of more academic articles which will be published in the British Dental Journal in 2019.

About the Centre for Sustainable Healthcare

An independent charity, the Centre for Sustainable Healthcare (CSH) has been leading efforts to incorporate the values of environmental sustainability into the health sector since its establishment in 2008. CSH is respected nationally for its work with clinical specialties, which combines research with support for change on the ground, underpinned by wider engagement with patients, and relevant industry and clinical bodies. The Centre began working in dentistry in 2015.

Please contact us with questions about this Guide or if you notice something that needs updating.

1. Policy statement: Sustainability in Dentistry. FDI World Dental Federation, 2017

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

1. Travel

Why is it important?

A recent study commissioned by Public Health England measured the carbon emissions and calculated the carbon footprint of dental services. It found that unlike the NHS wider health service footprint (where the carbon emissions contribution of travel is smaller), the highest proportion of emissions in dentistry is from travel (64.5%).[1]

As well as producing carbon dioxide, petrol and diesel vehicles also cause local air pollution with significant health effects particularly on young children and people with respiratory and cardiovascular disease. Air pollution kills 40,000 people in the UK every year.[2]

Reducing the need for travel and facilitating more sustainable alternatives such as public transport use, walking, cycling and car sharing will help to improve air quality and reduce travel associated emissions and sometimes also costs.

In a dental practice we need to consider staff and patient travel as well as transportation of goods and laboratory items to and from the practice. Patient journeys can be reduced by booking family appointments together and completing multiple interventions in a single visit, where possible. You may also be able to liaise with your suppliers and dental laboratories to reduce the number of deliveries.

In this section... *How to:*

References:

[1]PHE and CSH '**Carbon modelling within dentistry:** Towards a sustainable future' Accessed August 2018. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/724777/Carbon_modelling_within_dentistry.pdf

[2]Holgate, S. 2017, '**Every breath we take: The lifelong impact of air pollution** - A call for action,' Clinical Medicine, Journal of the Royal College of Physicians of London, 10.7861/clinmedicine.17-1-8.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Survey travel patterns of your staff and patients to find out how they currently travel and what could help them to incorporate more walking or cycling
- Encourage and promote active travel and public transport options by sharing resources in the practice and on the practice website
- Provide showers, changing facilities, lockers and secure cycle parking where possible
- Sign up to the Government's **'Cycle to Work Scheme'**
- Combine patient appointments if appropriate to reduce overall travel
- Investigate the transport of goods and consider if it can be made more sustainable
- Always consider preventive dentistry
- Use information technology (e.g. Telemedicine and electronic referrals) to reduce staff and patient travel

Resources

Duane, B., Ramasubbu, D., Harford, S., Steinbach, I., Stancliffe, R., Croasdale, K., Pasdeki-Clewer, E. (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

1a. *How to:* Encourage active travel

Why is it important?

Active travel has many potential benefits including health, environmental and economic. Encouraging active travel such as walking or cycling will help to reduce the carbon emissions costs and pollution associated with using vehicles.

The National Institute of Clinical Excellence (NICE) recommends that employers develop policies to encourage employees to walk, cycle or use other modes of transport involving physical activity to travel to and from work as part of their working day.

What does a Sustainable practice look like?

Offering incentives such as prizes e.g. a pedometer, sportswear or gym/sports class memberships, signing up to the Government's Cycle to Work Scheme (to enable staff to buy a bike tax-free) as well as hosting activities or cycling and walking events at the practice may encourage your staff to increase active travel.

Electric bikes (or e-bikes) are pedal bikes assisted by an electric motor. This can make cycling accessible to a wider range of people over longer distances – potentially with less sweating involved!

Real Life examples:

NHS Tower Hamlets
To encourage a shift away from car use to walking and cycling to work, a Travel Plan has been produced for NHS Tower Hamlets. Surveys were done to identify travel patterns and targets were set to increase staff cycle to work and decrease staff driving to work. New cycling facilities were installed at various hospital sites. Shower and locker facilities renewal are underway. Momentum is maintained by organising Cyclists' breakfasts, sharing a range of information in the intranet and the creation of a **'Cycle User Group'** email list. The **'Cycle to Work'** Scheme is being implemented to enable staff to buy bikes at a reduced cost, tax free.

King's College Hospital Walking Incentives
An ongoing project by King's College offers goodie bags with free pedometers as well as guided walks to raise awareness and incentivise staff to walk as part of their journey to work.

Hillingdon Hospital Green Travel Incentive
A points scheme has been started for staff members where they can collect points each time they swap from driving to commute on foot/bike and for the miles travelled. Cycling/walking-related prizes are given in exchange for points earned.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Install secure cycle parking at the practice 
- Provide showers, changing facilities and lockers where possible 
- Sign up to the Government's **'Cycle to Work Scheme'** and let staff know that it applies to e-bikes too 
- Encourage and promote active travel options by sharing resources in the practice and on the practice website 
- Display walking/cycling routes and maps of your local area in the practice 
- Survey travel patterns of your staff and patients using an online survey tool (*such as Survey Monkey*) to find out how they currently travel and what could help them to incorporate more walking or cycling 
- Liaise with your local gyms and sports centres to find out about facilities, membership promotions and options for your staff 
- Start a step challenge! How about collating the pedometer count for the whole staff every week and see how high you can get it? 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

NHS Tower Hamlets Travel Plan
http://map.sustainablehealthcare.org.uk/nhs-tower-hamlets-travel-plan

King's College Hospital Walking Incentives
http://map.sustainablehealthcare.org.uk/walking-incentives

Hillingdon Hospital Green Travel Incentive
http://map.sustainablehealthcare.org.uk/green-travel-incentive

More links:

National Institute of Clinical Excellence guidance - Physical activity in the workplace
https://www.nice.org.uk/guidance/ph13

Department of Transport research: Cost benefits of active travel
https://www.gov.uk/government/publications/economic-case-for-active-travel-the-health-benefits

Government Cycle to Work Scheme
https://www.gov.uk/government/publications/cycle-to-work-scheme- implementation-guidance

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

1b. *How to:* Install electric vehicle charging points

Why is it important?

Fuel-burning vehicles release emissions into the atmosphere which are harmful to the environment and to our health. A study has found that electric vehicles emit half the carbon emissions of diesel vehicles. Britain has made a commitment to ban all new petrol and diesel cars and vans from 2040 in a bid to tackle air pollution.

Providing electric vehicle charging points at your dental practice promotes the message of sustainability and can encourage staff and patients who travel by car to think about using an electric/hybrid vehicle. Charging points can cost as little as £300 if purchased through the Office for Low Emission Vehicles (OLEV), a government run scheme. Life Cycle Analysis of the Climate Impact of Electric Vehicles, October 2017. VUB university, Brussels

https://about.bnef.com/electric-vehicle-outlook/

What does sustainable practice look like?

Real life examples:

Northumbria Healthcare NHS Foundation Trust are now using a fleet of 13 all electric Nissan e-NV200 vans which have low running costs and zero emissions mobility for the delivery of health supplies, mail and sample collection across its hospital and community sites. Its estimated that the vans will save 59 tonnes of carbon emissions annually (the equivalent of flying 5 times from the UK to Hong Kong).

North East Ambulance Service have installed electric vehicle charging points at 6 sites in the North East. They say: "the uptake of electric vehicles was vital for the Ambulance Service. We aim to be proactive in promoting a cleaner environment and the use of electric vehicles also enables us to save money on high fuel costs".
They used an independent company 'Elm Electric Vehicle Charging Solutions' who provide private and public sector organisations with fast and reliable charging solutions.

Whittington Hospital NHS Trust is planning to reduce the rate of its annual parking permit fee for staff with electric vehicles. The charge of the permit is linked to the carbon emissions of the vehicle to encourage individuals to switch to other modes of transport. Electric vehicles will get 6 months free.

Modelled example:

Sam is a dental nurse at a rural village dental practice in Somerset. His commute to work from home takes 40mins by car and would take over 1h30 if using public transport. He has recently bought a new 'plug-in-hybrid' to replace and upgrade his old petrol car which was becoming too expensive to run.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Modelled example *continued:*

He joined the dental practice a year ago whilst the practice was having electric vehicle charging points installed. There are 2 charging points available in the front drive of the practice for use by staff and patients.

They are very efficient and can charge a car up to 80% in 30 minutes.
Sam can leave his car to charge during the day whilst he is at work, or even just during his lunch break. Being in a rural location, many patients also can only easily access the practice by car. Patients with electric vehicles are pleased they can charge their cars during their appointment and many are enquiring about the charging points.

The practice reception provides information about electric vehicles and charging points, including leaflets and links from the supplying company and also from a local electric car dealership with whom the practice has liaised with which often have promotions.

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Liaise with car manufacturers and companies who provide electric vehicle charging point installation to receive more information about the feasibility of installation at your practice

- If your practice does not have a car park, liaise with your local Council to install charging points on public car parks nearby

- Display information regarding the benefits of electric vehicle use in the practice and where the nearest charging points are located

- Encourage providers of services such as your dental laboratory to switch to using an electric vehicle

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Northumbria Healthcare NHS Trust and North East Ambulance Service:
http://www.elmev.co.uk/tag/case-study/

Whittington Hospital NHS Trust permit charges for electric vehicles:
http://map.sustainablehealthcare.org.uk/parking-permit-charges-linked-carbon-emissions

More links:

Useful information about electric vehicle charging points:
http://www.eco-environments.co.uk/electric-vehicle-charging-points/

The Guardian: carbon emissions of electric vehicles
https://www.theguardian.com/environment/2017/oct/25/electric-cars-emit-50-less-greenhouse-gas-than-diesel-study-finds

Duane. B, Ramasubbu. D, Steinbach. I, Stancliffe. R, Croasdale. K, Harford. S, Lomax. R, (in press). Environmental sustainability and travel within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

2. Equipment and Supplies

Why is it important?

The manufacture and distribution of any object has an environmental impact, requiring input of raw materials and energy, often accompanied by release of pollutants to air, land and water as well as changes to land use and biodiversity.

These impacts are often not visible to us at the point of use, whether of paper, plastic packaging, instruments or dental restoration materials. However, for the NHS in England, for example, supply chain emissions make up 57% of the total carbon footprint.

Dental teams can influence the environmental impact of their equipment and supplies by reviewing routine practices to ensure that items are only used when they are really necessary, looking for environmentally friendly alternatives and by engaging with suppliers to develop more sustainable practices.

In this section… *How to:*

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Buy less. It's often that easy 
- Avoid single use devices where appropriate 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Choose the chemicals you use carefully
- Use social media and online tools to communicate with your patients
- Choose recyclable, reusable products especially in your stationary items
- Consider ***Fairtrade*** items for your grocery products
- Choose 2-3 of your most used products and get your supplier to complete a sustainability/ethical questionnaire
- Choose suppliers who use minimal/ environmental friendly packaging
- Manage your stock to reduce purchasing products you don't need and may waste

Resources

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E, (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

2a. *How to:* Procure paper and timber

Why is it important?

Paper and timber are sourced from trees. A tonne of paper requires 24 trees to be cut down, and more than 350 litres of water are needed for processing and transport to produce this paper.

Reducing the quantity of the paper the practice procures can be achieved by double sided printing/photocopying, and using digital media such as email or text messages to communicate with both patients and staff.

Engaging with suppliers and developing a questionnaire (see guide 2a) for assessing their sustainability practices when procuring paper and timber helps to ensure the products and their delivery are as sustainable as possible, as well as encouraging suppliers to develop more sustainable practices.

Ensuring both the paper and timber you procure meets the Government Buying Standards (GBS) via their checklists can help to guarantee the sustainability and legality of the products you purchase, with specifications on the minimum recycled content of paper products and best practice being highlighted. GBS are voluntary but are best practice for dental practices.

What does a Sustainable Practice look like?

Modelled example:

Bill is an associate dentist at a mixed NHS/dental practice, which recently developed a procurement policy, which started with paper but is now implemented for all goods they purchase.

As part of this policy, they used the Government Buying Standards (GBS) policies for procurement of paper products and timber to ensure the quality and sustainability of purchased goods and also engaged with their suppliers via questionnaire to assess their environmental practices. Since introducing the recycling policy the practice has found that more suppliers are prioritising sustainability, and they are more confident that the goods they purchase meet the GBS criteria.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Use less paper. Avoid unnecessary print-outs; set printers to double-sided printing

- Use social media and online tools to communicate with your patients

- Adhere to Government Buying Standards to ensure procured goods meet legal and sustainable standards, such as paper with a 75% recycled content and recycled toilet paper

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Hampshire Partnerships NHS Trust - Procurement:
http://map.sustainablehealthcare.org.uk/hampshire-partnerships-nhs-trust/sustainable-procurement

South East Coast Ambulance Service- Procurement and Tendering:
http://map.sustainablehealthcare.org.uk/south-east-coast-ambulance-service-nhs-trust/procurement-tendering

Winchester and Eastleigh NHS Trust - improving sustainable procurement:
http://map.sustainablehealthcare.org.uk/winchester-eastleigh-healthcare-nhs-trust/improving-sustainable-procurement

More links:

GBS standards for paper product procurement:
https://www.gov.uk/government/publications/sustainable-procurement-the-gbs-for-paper-and-paper-products

GBS standards for timber procurement:
https://www.gov.uk/government/collections/timber-procurement-policy-tpp-guidance-and-support

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer, E. (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

2b. *How to:* Reduce plastic purchasing and waste

Why is it important?

Plastic is having an increasingly detrimental impact on the environment, biodiversity and health. 79% of the plastic produced over the last 70 years has been thrown into landfill sites or into the environment, with only 9% of it being recycled and the rest incinerated. 8 million tonnes of plastic enters our oceans each year. Plastic does not naturally biodegrade but breaks down into smaller 'micro-plastics'. It can absorb other chemicals and can enter the food chain, poisoning wildlife, destroying ecosystems and putting human health at risk.

Dental practices produce huge amounts of waste plastic from plastic cups, disposable syringes, gloves, single use instruments, oral hygiene products, stationary and more.

Finding ways to limit the purchase of plastic and plastic-packaged items, encouraging plastic recycling and liaising with manufacturers about their plastic use and sustainability will help to reduce the plastic 'burden' and may reduce costs to your practice.

https://www.independent.co.uk/environment/plastic-how-planet-earth-environment-oceans-wildlife-recycling-landfill-artificial-a7972226.html

What does a Sustainable Practice look like?

Modelled example:

Susan works as a practice manager for a mixed NHS/Private practice. As a team they have decided to adopt a 'Reduce, Reuse, Recycle' policy to reduce their plastic use and waste. Clearly labelled recycling bins have been placed in all patient and staff areas.

The practice uses pouches for instruments after they are autoclaved, which are part paper and part plastic which are easily separated. There are now small boxes in each surgery, one for the paper and one for plastic. The nursing staff have carried out an audit and found that this initiative has greatly reduced the number of pouches being disposed of incorrectly into the clinical waste bins.

The practice has also introduced a selection of sustainable oral hygiene products including bamboo toothbrushes from 'The Humble Brush' which are becoming increasingly popular with their patients.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Consider putting out plastic cups for patients to rinse only when needed (rather than as standard)
- Avoid single use devices where appropriate: use stainless steel impression trays, prophy cups and suction tips
- Use glass/stainless steel pots vs. plastic 'Dappens' pots
- Carry out an audit to see how much plastic your practice is using and whether all recyclable plastic is being recycled
- Share information and communicate your plastic reduction efforts to patients
- Advertise alternative, non-plastic oral hygiene products e.g. bamboo toothbrushes
- Liaise with dental product manufacturers about the sustainability and recycling potential of their products- ask them if they have signed up to the UK Plastics Pact

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Remediating hospital paper cup wastage
https://networks.sustainablehealthcare.org.uk/networks/eyehealth-susnet/remediating-hospital-paper-cup-wastage-challenges-and-recommendations

The Guardian: How plastic is damaging planet earth
https://www.independent.co.uk/environment/plastic-how-planet-earth-environment-oceans-wildlife-recycling-landfill-artificial-a7972226.html

Ecover sustainable plastic packaging strategy
http://horizons.innovateuk.org/case-studies/124

The Guardian: Made from bamboo, pig hair and yoghurt pots, can eco-toothbrushes take off?
https://www.theguardian.com/sustainable-business/2016/oct/06/eco-toothbrushes-biodegradable-bamboo-pig-hair-yogurt-pots-plastic-waste-landfill

Bamboo Toothbrushes by The Humble Brush
https://thehumble.co

UK Plastics Pact
http://www.wrap.org.uk/content/the-uk-plastics-pact

Colgate Terra-Cycle Oral Care Products Recycling Programme:
https://www.terracycle.co.uk/en-GB/brigades/colgate#how-it-works

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E. (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

2c. *How to:* Reduce chemical waste

Why is it important?

Chemicals used in healthcare can be hazardous to human health and also to the environment. Research shows that household cleaners, paints and perfumes have become substantial sources of urban pollution.

Many chemicals are used daily in dental practice, including dental materials such as amalgam, cleaning and disinfectant products, radiography equipment and Nitrous Oxide for sedation.

There is an abundance of legislation surrounding the use of hazardous substances in healthcare. COSHH (Control of Substances Hazardous to Health Regulations) requires all dental employers in the UK to control exposure to hazardous substances to prevent ill health. The 'Minamata Convention on Mercury' effective from August 2017 encouraging the phase down of amalgam use has been designed to protect human health and the environment from anthropogenic emissions and releases of mercury and its compounds.

Finding ways to and use products with both safer and more sustainable chemicals will have environmental benefits and health benefits for staff and patients.

What does a Sustainable Practice look like?

Modelled example:

Sanjit is an associate dentist at a mixed NHS/Private practice. A policy for the safe use of chemicals has been adopted by the practice after an initiative was taken by the team to review all of the chemicals used at the practice.

They have changed to using sustainable alternatives for cleaning and disinfecting products where possible. Each team member has been trained in the safe use and disposal of chemicals in the practice and this training is renewed annually. Sanjit's practice now also uses a fully digital radiography system.

Since the 'Minamata Convention' became effective, the practice has agreed on the use and phase down of Amalgam in the practice wherever possible. They have invested in trialling a variety of new Composite Resin and Glass Ionomer restoration materials, to find materials of high quality and comparable properties.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Be aware of the legislation surrounding use of hazardous substances in the dental practice 
- Use less toxic and more sustainable/eco-friendly cleaning products 
- Use amalgam alternatives for dental restorations when possible and clinically appropriate 
- If using amalgam, use encapsulated amalgam and an amalgam separator 
- Use digital radiography equipment to avoid the use of toxic processing chemicals 
- If providing inhalation sedation with Nitrous Oxide, train staff on the health and environmental risks associated with its use; use the minimum effective dose possible; use correctly fitting face masks for patients; monitor airborne concentrations of waste gas; check equipment for faults or leaks; ensure adequate ventilation; consider purchasing a unit which converts waste gas into a less harmful product 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

More links:

Pocket Dentistry: Hazardous Substances
https://pocketdentistry.com/9-hazardous-substances/

The Independent: 10 Best Natural Cleaning Products
https://www.independent.co.uk/extras/indybest/house-garden/kitchen-accessories/10-best-natural-cleaning-products-biodegradable-washing-up-liquid-dishwasher-toilet-cleaner-soap-a7833311.html

British Dental Association information on the 'Minamata Convention':
https://bda.org/dentists/policy-campaigns/public-health-science/Pages/The-Minamata-Convention-on-mercury.aspx

The environmental impact of dental amalgam and resin-based composite materials Mulligan. S, Kakonyi. G, Moharamzadeh. K, Thornton. S and N. Martin BRITISH DENTAL JOURNAL | VOLUME 224 NO. 7 | APRIL 13 2018
https://www.nature.com/articles/sj.bdj.2018.229

Duane, B., Ramasubbu, D., Harford, S., Steinbach, I., Stancliffe, R., Croasdale, K., Pasdeki-Clewer, E. (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

2d. *How to:* Engage your suppliers to become more sustainable

Why is it important?

For primary care dentistry, procurement accounts for 19% of the carbon footprint, and for the NHS as a whole, 57%. In order to achieve the targets outlined in the Climate Change Act, reducing our carbon emissions from procurement is essential.

Engaging with suppliers and developing a questionnaire for assessing their sustainability practices when procuring goods is a good way to establish whether the products and their delivery are as environmentally sustainable as they can be and can also encourage suppliers to develop more sustainable practices.

What does a Sustainable Practice look like?

Real life example:

Hampshire Partnerships NHS Trust worked with Procure, Supply Chain and other procurement agents to develop specifications that reflect a lowering of the supplier's carbon footprint, and used questionnaires to the suppliers to support this.

Winchester and Eastleigh NHS Trust developed an Action Plan to improve sustainable procurement, working alongside NHS Pro-Cure. The Action Plan included making staff more aware of sustainable procurement, adopting the draft Sustainable Procurement Policy developed by Pro-Cure and to subsequently develop a local sustainability policy.

Modelled example:

Bill is an associate dentist at a mixed NHS/dental practice which has recently developed their own procurement policy that started with paper but now includes all goods they purchase.

As part of this policy, the practice created a questionnaire that they can send to potential suppliers which asks questions about their sustainability statement and policies.

This questionnaire encourages companies to think about their practices and identifies companies which are committed to environmental sustainability. The questionnaire covers areas such as food, supply chain, materials and chemicals, recycling and packaging, carbon emissions, energy use and travel.

Bill discusses this questionnaire with companies and highlights to businesses how important it is for the practice to engage with others who are committed to green policies. He shares information about sustainable companies on his dental blog and tells colleagues about them at LDN meetings he goes to.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Create a Sustainability questionnaire (see example below) and use this when engaging with suppliers to assess their commitment to sustainable practice

- Ask all suppliers if they have a sustainability statement and ask if you can be emailed a copy

Table 1: Suggested Questionnaire for manufacturers.

Questionnaire to suppliers and manufacturers

We take the sourcing of our products seriously. We try to ensure that we buy products from ethical sources and from a supplier that takes an active interest in minimising their impact on the environment.

We would like our patients to be given this information so they are able to make informed decisions about the products that they are purchasing. With this in mind we are now starting to classify our products depending on some of the environmental issues involved.

General Policy

Does the manufacturer and/or distributer have their own environmental policy and sustainability report?[28]

Please attach:

Does the manufacturer and/or distributer have an environmental, quality management or health and safety management system in place (e.g. IS014001, IS09001, OHSAS18001) or any other environmental certifications?

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

Sustainable food?

Does the manufacturer have a goal to increase employee access to local, sustainable food in cafeterias etc?

Sustainable supply chain?

Can the manufacturer trace the supply of the product back to the original manufacturer and if so where was the item produced?

Can the manufacturer trace the supply of materials back to the original raw materials?
Might need to explain some of these…above?

Ethical supply chain?

In terms of labour used at the factory - can we be reassured that the standards within the manufacturing factory are humane and ethical?

Does your company have an established environmentally and sustainable preferable purchasing and supply chain program? If so, please describe.
Does the manufacturer and/or supplier employ children to work at any of its facilities?

Is the workers freedom of movement unreasonably constrained by the manufacturer and/or supplier? Do employees receive a fair wage for their work (at or above national minimum wage)?

What policies and/or management systems are in place to ensure worker health and safety, including reasonable hours worked?

Does the manufacturer and/or supplier have any labour related certifications (e.g. fair trade, social accountability, unionized)?

Materials and Chemicals

Does the company have a commitment to know all of the chemical and material ingredients of products sold by your company and its subsidiaries? If yes, is the list publicly available?

Are any of the materials used in the manufacturer of the product considered to be harmful to the environment?

Do the materials used to make the product come from a natural and sustainable source?

What is the environmental impact of the material and process used to make the product? (Are toxins released into the environment during manufacture?)

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

Materials and Chemicals *continued*
Does the product contain any plastic? And if so, is it pure or composite material?

Is the plastic a petroleum based plastic or natural based acetate?

Does the product contain metal alloys? In what concentrations?

Does the product contain any dyes, paints or other additives? If so, is the chemical information available?

Packaging and recycling See packaging and recycling
Does the manufacturer and or suppliers make any attempt to reduce the environmental impact of their packaging?

Is the product of raw material of the product recyclable?

Does the company offer any end-of-life product take-back programs, including electronics? If so, please list all items you take back for responsible recycling, donation, or reuse, and outline the process for participating in the program 28.

What percent of total weight or volume of manufacturing input material is recycled material? (Use Global Reporting Initiative ((GRI)) estimation methods to obtain answer)

What percent of total waste generated by your company and its subsidiaries was recycled or reused?

Carbon emissions
Has the product had a carbon footprint undertaken?

Has the company measured and taken steps to reduce its greenhouse gas emissions (GHG)?28 *(See our paper for more details)*

Energy use
In the previous year what percent of energy in your company and its subsidiaries consumed was derived from eligible renewable sources?28 (see our energy paper for more details)

Travel use
Does your company have a sustainable travel plan? (see our travel paper for more details)

Follow Government Buying Standards (GBS) when purchasing goods - this will ensure procured goods meet legal and sustainable standards, and that paper has a high recycled content.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Hampshire Partnerships NHS Trust - Procurement:
http://map.sustainablehealthcare.org.uk/hampshire-partnerships-nhs-trust/sustainable-procurement

South East Coast Ambulance Service - Procurement and Tendering:
http://map.sustainablehealthcare.org.uk/south-east-coast-ambulance-service-nhs-trust/procurement-tendering

Winchester and Eastleigh NHS Trust - improving sustainable procurement:
http://map.sustainablehealthcare.org.uk/winchester-eastleigh-healthcare-nhs-trust/improving-sustainable-procurement

More links:

BDA Members advice on ethical procurement and environmental sustainability from:
https://www.bda.org/dentists/advice/ba/Documents

GBS standards for paper product procurement:
https://www.gov.uk/government/publications/sustainable-procurement-the-gbs-for-paper-and-paper-products

GBS standards for timber procurement:
https://www.gov.uk/government/collections/timber-procurement-policy-guidance-and-support-tpp-

Duane, B., Ramasubbu, D., Harford, S., Steinbach, I., Stancliffe, R., Croasdale, K., Pasdeki-Clewer, E. (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

2e. *How to:* Optimise stock inventory management

Why is it important?

Stock wastage has a huge environmental and financial impact. Out of date chemicals, dental products and stock often are disposed of in landfill or require specialist collection. Regular stock audit scan ensure that products nearing the end of their shelf life can be identified and used and wastage is minimised.

In larger facilities like hospitals, adopting the GS1 standards (Global Standards designed to improve efficiency, safety and visibility of supply chains) can also help to improve patient safety, by identifying stock which has reached dangerously low levels.

What does a Sustainable Practice look like?

Real life example:

Portsmouth Hospitals HSE Trust recognised the need for a good inventory management system. Knowing what stock is available at all times across the entire Trust not only reduces waste and saves money, but is essential for improved patient care. Their aim was to track all products from suppliers to the point-of-use, at patient level. They knew they needed to implement the use of GS1 standards, complying with the Department of Health's GS1 and PEPPOL adoption strategy. To do this, the suppliers needed to be educated.

Between January 2014 and May 2015 the correct use of GS1 standards by these suppliers increased from 37% to 65%. Now they can receive products by simply scanning the outer packaging barcodes – pulling through all the serial, batch, lot numbers in one scan, as well as expiry dates. The individual product is only scanned at the point of use. This has resulted in inventory data being accurate – and visible to everyone across the Trust. Waste has been reduced to less than 1% and benefits have also been seen in the way recalls are managed - with products easily identified and removed from use, or tracked to patients.

Modelled example:

Louise is a practice manager at a mixed NHS/dental practice, which tracks all current stock via a spreadsheet, with an audit scheduled monthly.

This allows stock levels to be regularly assessed, with products nearing their expiry date highlighted. The stock is also stored so that items that must be used sooner are placed in front.

This system allows stock needs to be predicted, meaning orders are completed less frequently, which reduces the associated carbon emissions from transport.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Audit stock monthly to identify any that is close to its expiry date and to inform ordering

- Reduce the frequency of orders once stock requirements can be more accurately predicted

Resources

Case studies:

H Portsmouth's Hospitals Inventory Management:
https://www.gs1uk.org/~/media/documents/marketing-documents/gs1_uk__portsmouth_casestudy.pdf

More links:

GS1UK.ORG:
https://www.gs1uk.org/our-industries/healthcare

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E. (in press). Environmental sustainability and procurement; Purchasing products for the dental setting. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

3. Energy

Why is it important?

The Buildings energy use makes up 15% of the carbon footprint of primary dental care. As well as contributing to greenhouse gas emissions, energy generation from fossil fuels is a significant source of air pollution, which in turn is responsible for 40,000 premature deaths each year in the UK.

Reducing energy consumption and investing in renewable electricity generation offer significant environmental, health and cost benefits for dental practices.

In this section... *How to:*

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Insulate your water cylinder 
- Seal off draughts 
- Double glaze 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

- Close your doors, blinds and curtains as appropriate

- Install a smart meter

- Turn off appliances at night, and at the end of the week

- Concentrate on reducing "high energy" using equipment

- When buying appliances always compare energy use (look for the Kilowatt rating)

- Switch to a green electricity supply

- Generate your own energy

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Resources

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E. (in press). Environmentally sustainable Dentistry: Energy use within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

3a. *How to:* Buy Green energy

Why is it important?

Switching to a green energy provider is a simple but effective way of incorporating sustainability into your dental practice.

There are range of green energy providers (Ecotricity, Good Energy etc), as well as green tariffs offered by mixed energy companies. Find out which providers are available in your area and whether you could be saving money by switching to a renewable energy source- price comparison sites can aid with this (see links below).

Modelled example

Sarah-Jane is a practice manager and at their last team meeting, a colleague mentioned that they were saving money since they changed energy provider at home. She used a comparison website to check her options, entering the practice postcode. She switched to a renewable energy company and the practice bills are the same or sometimes cheaper than before.

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Switch to a green electricity supply company 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Resources

More links:

Bulb. One Tariff for All. Online information available at:
https://bulb.co.uk/tariff/(Accessed May 2018)

The Big Clean Switch:
https://bigcleanswitch.org/business/ (accessed September 2018)

Confused about Energy. Energy Prices. Online information available at:
https://www.confusedaboutenergy.co.uk/index.php/domestic-fuels/fuel-prices (accessed May 2018)

US Energy Information Administration. Frequently Asked Questions. Online information available at:
https://www.eia.gov/tools/faqs/faq.php?id=73&t=11 (accessed May 2018)

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E. (in press). Environmentally sustainable Dentistry: Energy use within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

3b. *How to:* Generate your own power

Why is it important?

The burning of fossil fuels for energy has a detrimental impact on the environment and dental practices consume a substantial amount of energy.

However there are a number of systems dental practices could consider to generate their own energy. The benefits include making use of secure and local resources, reducing dependence on non-renewable energy, helping to reduce the production of greenhouse gases and other pollution and reducing your energy bills. It is also possible to generate income by selling your surplus energy back to your energy provider in some cases.

The most common small-scale energy generating systems available are:

Solar water heating (solar thermal): This is the most cost efficient option with pay back times for a £4000 system as little as 7.5 years. (This estimate is based on numbers provided from the Energy Saving Trust for a domestic household size of 6 where the solar thermal would be replacing a gas heating system).

Solar energy directly heats fluid in the tubes or panels which in turn heats water for use in sinks or showers within the practice. This is generally used in combination with a boiler which can top up the water temperature as necessary. A duel coil hot water tank is required (the system is not suitable for use with an on-demand '*combi* ' boiler).

Solar Photovoltaic systems (solar panels): The most common system is a 4kW generation capacity and can be installed without special permission. The current cost would be approx. £6000-£11000, with an inverter needing to be replaced every 10 years. This would suit practices who spend more than £10 per week on electricity, with a pay-back period on the solar panels in around 10-12 years.

Biomass systems: these are wood-fuelled, burning wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. Biomass heating of a practice can be sustainable if the Carbon dioxide emissions generated is taken up by forests or trees at the same rate as it is burnt. These would only be suitable for large practices, probably in rural areas with access to biomass products, and space to store them. Boilers can be expensive with installation costs of £6000-12000 and hardware around £5000-£12000.

Ground source heat pumps (GSHPs): use pipes buried in the ground to extract heat and transfer it for water or underfloor or warm air heating systems. A heat pump costs around £5000.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Why is it so important? *continued*

Wind Turbines: A dental practice could consider a 1KW-2KW wind turbine, however it would need to be sited away from buildings, trees etc. There may also be noise restrictions for their use, as well as planning regulations if the turbines are bigger than 1KW. Costs are around £2000 for a 1KW turbine.

Hydro technology: uses running water to generate electricity e.g. from a stream or river. This is very site specific and the site needs a professional assessment

What does a Sustainable Practice look like?

Real life example:

East Kent Hospitals University Trust installed a solar panel system on the roof of their Heart Centre to supply energy for WC facilities. The implementation cost was estimated at £8-10K and the life cost payback was anticipated to be within 10-12 years. *Crispin & Borst* were appointed as the lead contractor for the design and build project.

Modelled example:

Natalie works as a Practice Manager at a mixed NHS/private practice. 6 months ago the practice had a solar panel system installed on the roof. As well as lower electricity bills which have been cut by approximately one third, they are part of the Government's 'Feed-in Tariff scheme' and the practice is receiving money each month for the electricity generated.

This money is being used to save for the installation of a ground source heat pump which the practice hope to install in 1 years time. An assessment of the grounds behind the practice has been carried out for this by a reputable installer.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Get a site assessment for renewable power options
- Find a reputable installer* and discuss the options available to your practice
- Find out if you need planning permission from your local planning department
- Find out if you could benefit from the Government's **'Feed-in Tariff scheme'** which pays you for the electricity you generate, even if you use it. (See Links)
- Install solar thermal and/or photovoltaics.

*Installers certified under the 'Microgeneration Certification Scheme (MCS) and who use MCS-certified products are recommended by the Energy Saving Trust

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

East Kent Hospitals University Trust
http://map.sustainablehealthcare.org.uk/east-kent-hospitals-university-nhs- trust/solar-panel-domestic-hot-water-dhw-services-wc-facilities-h

More links:

Generating your own power guide:
http://www.greenerscotland.org/home-energy/generating-your-own-power

Electricity Guide:
http://www.electricity-guide.org.uk/home-power-generation.html

Energy Saving Trust installation information:
http://www.energysavingtrust.org.uk/renewable-energy/installation

Energy Saving Trust: Government Feed In Tariffs (FITs):
http://www.energysavingtrust.org.uk/renewable-energy/electricity/solar- panels/feed-tariffs

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E. (in press). Environmentally sustainable Dentistry: Energy use within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

3c. *How to:* Monitor overheating and insulate your building

Why is it important?

Heating a dental practice consumes a substantial amount of energy, produces carbon emissions and is costly.
Improving energy efficiency by monitoring overheating and improving insulation is not only good for the environment but in many cases will save the practice money.

Within the UK properties which are constructed, sold, or let require an Energy Performance Certificate (EPC). Insulation increases the EPC rating of the practice building, which can add to its re-sale or rental value.

Monitor overheating

Dental practices should consider room thermostats, timers and thermostatic valves to improve energy use and prevent over-use of energy when not needed. This can save domestic users £150 on their gas bill and attendant carbon emissions.

It is also possible that there may be areas in the practice which are over-heated. Staff need to be encouraged to report such occurrences to improve energy efficiency. Automatic door closures can reduce the amount of heat loss/gain in rooms. Air conditioning can also be an intensive use of energy so monitoring its use and employing passive cooling measures (such as closing window blinds and opening/closing windows appropriately) are important. Make sure that thermostats are not set to trigger heating and air conditioning at the same time!

Insulation:

Loft insulation:
One of the most cost effective ways to improve energy efficiency is to insulate the loft. Dental practices should increase their insulation to at least 270mm to improve their EPC rating by 10-15 points (possible costs £292 with £20 annual savings).

Cavity wall insulation and solid wall insulation are other options, increasing the EPC rating by 5-10 points however it is also a more expensive choice, with proportionately less attractive annual savings (possible costs £4283 with £89 annual savings)

Insulating the hot water cylinder:
Approximate cost: £16; annual savings £29, EPC rating a few points.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Insulation continued:

Double glazing:
Increases the EPC rating several points.

Installing energy efficient lighting
(£14 cost; £15 annual savings)

Sealing around windows, and doors using products such as 'caulkor' weather stripping can slightly improve energy efficiency.
This draught proofing (£107 cost, annual savings: £12) can also increase your EPC rating. Make sure that adequate ventilation is maintained.

What does a Sustainable Practice look like?

Modelled example:

Amber is a practice owner of a mixed NHS/private practice which is in a mid 1930's semi-detached house. To save money and become more sustainable, she decided to install loft insulation 9 months ago, at the end of last summer. It was completed during 1 week. 200mm of glass fibre insulation added to existing 100mm from when the house was built, costing £150.

Everyone in the practice is encouraged to be involved in saving energy in the practice and monitoring overheating. This is part of the practice's sustainability policy and is discussed at each practice meeting. There are thermometers in each room so that the room temperature can be monitored. There are posters displayed in the practice to remind all staff to use the thermostats to reduce amount of energy used for heating and turn off air conditioning when not needed.

It is now Spring and on reviewing the practice energy bills for the winter period, she is pleased to see there has been a significant decrease, by approximately 20% which is very promising. The practice is now being assessed for cavity wall and solid wall insulation to provide further insulation and cost savings.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Insulate your water cylinder
- Insulate your loft (if you have one)
- Seal off draughts
- Double glaze
- Close your doors, blinds and curtains as appropriate to let heat In or keep it out
- Review thermostat position and timer settings
- Bleed and externally clean radiators regularly; do not cover them
- Minimise use of air conditioning, and close doors to air conditioned areas

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Energy Saving Case Studies:
http://www.energysavinghomes.org.uk/case-studies/energy-saving-case-study-8

More links:

Energy Saving Trust: Insulation
http://www.energysavingtrust.org.uk/home-insulation

Duane. B, Ramasubbu. D, Harford. S, Steinbach. I, Stancliffe. R, Croasdale. K, Pasdeki-Clewer. E. (in press). Environmentally sustainable Dentistry: Energy use within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

3d. *How to:* Adopt energy efficient technologies

Why is it important?

Apart from considering how a dental practice is heated or cooled, there are a number of other ways to reduce energy-related carbon emissions within the practice.

The energy use of equipment can be reduced- for example, curing lights are now using LED technology, lowering their energy use further. When purchasing new products, the practice should aim to procure the most energy efficient appliances, and opt for the longest cost-effective warranty. Many appliances e.g. microwaves and fridges are covered by energy appliance rankings.

Within the dental practice, lighting can use a lot of power. If a practice contains eight 60 Watt light bulbs and these are turned on for 10 hours a day, the cost is approximately £150 (507kg CO2e) per year. Changing all the light bulbs to fluorescent would reduce the energy expenditure and carbon emissions by approximately one quarter, and the savings with LED bulbs would be even greater.

Computers differ in their energy consumption. Used 8 hours per day, 5 days per week, a desktop computer will consume between £25 and £62 of energy per year, and a further £50 per year if left on overnight. Dental practices can reduce energy consumption by choosing energy efficient smaller hard drives or laptops and by turning them off overnight. In larger organisations, software is available to force computers and monitors into standby or sleep.

What does sustainable practice look like?

Modelled example

Sara is a practice manager and has instituted an energy saving policy in the dental practice where she works. This involves a checklist to ensure both equipment and appliances are fully turned off at night or when not in use. When procuring new goods, she researches which product is most energy efficient and its lifespan as well as how it will be ultimately disposed of. She has noticed a slight reduction in the practice energy bills and will continue to monitor this over the next year to see how much money they will save per year.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Turn off appliances at night, and at the end of the week 
- Concentrate on reducing “high energy” using equipment 
- When buying appliances always compare energy use (look for the Kilowatt rating) 
- Use small, energy efficient hard drives, or laptop computers 
- Install low energy fluorescent or LED lighting 

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

More links:

European Commission. Energy Efficient Products. Online information available at: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficient-products

OVO Energy. 120 Ways to Save and Conserve Energy. Online information available at: https://www.ovoenergy.com/guides/energy-guides/120-ways-to-save-energy.html

Duane B, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Croasdale K, Pasdeki-Clewer E. (in press). Environmentally sustainable Dentistry: Energy use within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

3e. *How to:* Make efficient use of space

Why is it important?

Space utilisation is defined by the UK Higher Education Space Management Group (SMG) as a measure of "whether and how space is being used". Within dentistry space utilisation is about how often a dental space is used, and how much of a dental space is used (a combination of a frequency and occupancy).

Calculating optimal utilisation rates requires a structured approach to determine effective usage of dental surgery, reception, waiting room. A maximally efficient, effectively run and sustainable dental practice would always have the dental chair in use, so that the energy required to heat the building would be optimal.

What does sustainable practice look like?

Real life example

Duane (2012) found that a number of the newer buildings had larger energy per patient appointments than the older buildings that provided the same care. One of the reasons for this was space utilisation. The waiting room was large, and there was a number of large meeting rooms, which were not always utilised.

Modelled example

David is a dentist purchasing his first dental practice. He has told the architectural firm he has hired that he wants his practice to be designed in a sustainable way, and one aspect of that is space utilisation. He has ensured the surgeries and waiting rooms are optimised in terms of size, to save on heating costs, and his rota will ensure each surgery is being used throughout the day at the same timeslots to make sure the heating costs of the building are justified.

Actions

- When selecting or designing new buildings or practices, ensure the rooms are large enough for purpose but can be sustainably heated in Winter.
- Ensure dental rotas mean chairs are in constant use when the building is being heated- a shift rota may assist with this.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

Resources

Duane B, Hyland J, Rowan J, Archibald B. Taking a bite out of Scotland's dental carbon emissions in the transition to a low carbon future. Public Health 2012; 126(9): 770-777

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4. Waste

Why is it important?

Disposing of our waste and sending it to landfill or incineration has a major environmental impact through release of greenhouse gases and pollution of air, land and water.

However, more than 90% of the environmental impact of most products occurs in manufacture and distribution, i.e. before a packet is ever opened. So, where possible, we need to reduce the purchase and use of items in the first place to achieve the greatest environmental (and financial) savings.

A 'Reduce-Reuse-Recycle' policy in the dental surgery, reception, waiting room and staff areas will help to minimise waste and divert from landfill and incineration, saving money and reducing emissions.

In this Section… *How to:*

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

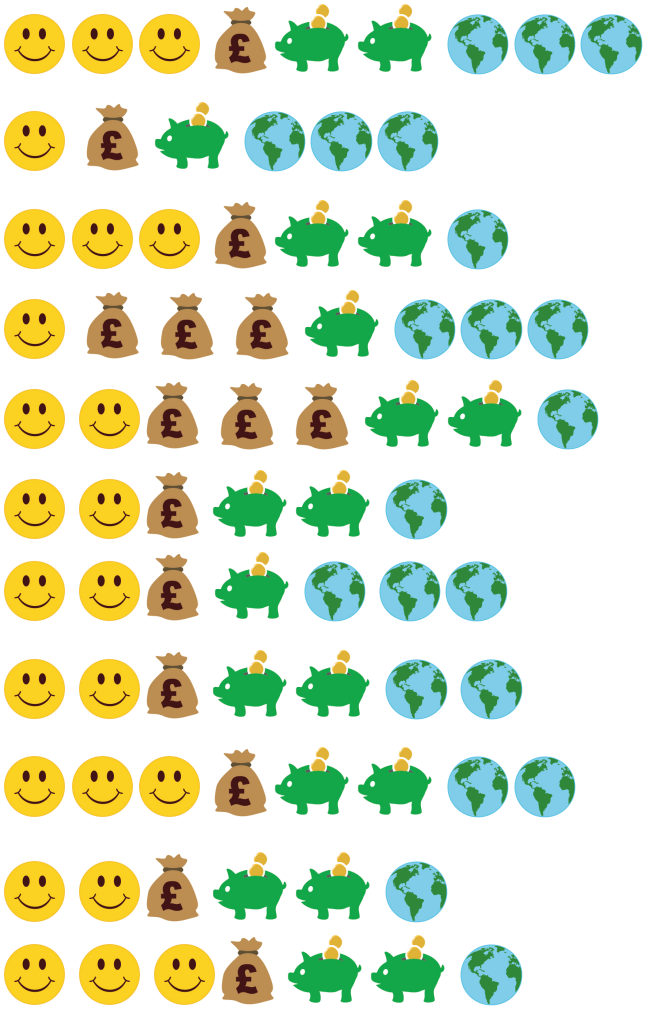
Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued:*

- Purchase less
- Influence manufacturers to support reduce/ reuse/ recycle
- Reduce paper use
- Reduce the impact of your nitrous oxide waste
- Buy durable equipment
- Waste less water
- Reduce medicines waste
- Re-use, up-cycle practice equipment
- Categorise and segregate your waste
- Manage food waste
- Undertake a waste audit



Resources

Duane B., Ramasubbu D., Harford S., Steinbach I., Swan J., Croasdale K., Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4a. *How to:* Improve segregation of clinical and non-clinical waste

Why is it important?

In a dental practice we need to consider both clinical and non-clinical waste. Poor waste segregation can lead to non-clinical waste being disposed of in the clinical waste stream, increasing the cost to the practice and potential harm to the environment from incineration.

A recent study supported by Plymouth University was carried out at Torrington Dental Practice, a mixed NHS/private dental practice in Devon, measuring the clinical waste generated during treatment sessions over a specified period. It showed that *paper* followed by *nitrile* constitute the highest proportion of the total waste. (Link to study below).

They used carbon conversion factors to measure potential carbon savings and their data would appear to support the view that it is possible to reduce carbon emissions and increase profitability by appropriately segregating and managing clinical waste.

What does sustainable practice look like?

Real life example

The renal unit at **Queen Margaret Hospital in Dunfermline** ran a Waste Watch Week and identified a lack of formalised waste management procedures pre and post dialysis treatments. 2.9kg of waste was generated per dialysis treatment (40.3 tonnes / year).

At the start of the year, 100% of this was sent as clinical waste for incineration. New bins were introduced for non-contaminated waste (e.g. packaging and bicarbonate bags) and clear guidance provided to staff on which disposal route to use for different items.

By April of the same year, incinerated waste had been reduced from 100% to 31%, with 69% now being directed into the domestic waste stream. A follow-on project allowed much of this domestic waste to be recycled.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Undertake a waste audit 
- Create a simple waste segregation guide for staff 
- Label bins clearly 
- In surgery, separate the sterile wrappers into plastic and paper for recycling 
- Put any waste that is not contaminated with blood/saliva, into the domestic or recycling bins whenever possible 

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Improved waste management in the Dialysis Unit Queen Margaret Hospital, Dunfermline
http://map.sustainablehealthcare.org.uk/nhs-fife/improved-waste-management-dialysis-unit-queen-margaret-hospital-dunfermline

More links:

What's in a bin: A case study of dental clinical waste composition and potential greenhouse gas emission savings J. Richardson, J. Grose, S. Manzi, I. Mills, D. R. Moles, R. Mukonoweshuro, M. Nasser and A. Nichols. British Dental Journal 220: 2 JAN 22, 2016
https://www.nature.com/articles/sj.bdj.2016.55

Less waste, more health. A health professional's guide to reducing waste. (includes "Which waste bin?" sustainability flow chart). Royal College of Physicians, London (2017).
https://www.rcplondon.ac.uk/projects/outputs/less-waste-more-health-health-professionals-guide-reducing-waste

A guide for bin placement in the healthcare environment can be found at:
http://www.greenhealthcare.ie/wp-content/uploads/2014/05/How-To-Undertake-a-Bin-Placement-Survey-revised.pdf

Many types of waste bins are available, by size/colour for use in surgery: e.g. from :
https://www.initial.co.uk/clinical-waste/waste-bins

Duane B, Ramasubbu D, Harford S, Steinbach I, Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4b. *How to:* Introduce recycling

Why is it important?

Recycling is an important way to reduce landfill and incinerated waste, and the associated environmental consequences. Commonly recycled items include: aluminium cans, tins, cardboard, paper, plastic, glass and food waste, which can be composted.

Providing clearly labelled recycling facilities throughout dental practices makes recycling accessible for both staff and patients, and can hopefully reduce costs associated with incineration, whilst reducing carbon emissions.

It is worth investigating waste disposal contracts on offer locally, as recycled materials have a financial value and some companies reflect this in a lower cost for disposing of recycled versus domestic waste.

What does sustainable practice look like?

Real life example

Frimley Park Hospital NHS Foundation Trust reduced clinical waste, increased staff awareness of recycling and saved costs by providing recycling facilities throughout the hospital for staff, patient and visitor use- 72 recycling bins were placed, with specific bins for clinical areas to meet infection control and fire safety standards.

Oxford University Hospitals NHS Trust has reduced the amount of waste going to landfill or incineration by introducing recycling into the operating theatre setting with recycling bins in every anaesthetic room, recovery and rest area.

Modelled example

Matthew is an associate dentist at a mixed NHS/dental practice, which recently implemented a Recycling Policy. As part of this policy, recycling bins were introduced in every room of the practice, including the clinical areas. Two recycling bins were placed in each surgery, which correspond to the Council's recycling collection groups. One box is for cardboard, glass, and foil items and the other for paper, plastic and glass items.

Any clinical waste which may be contaminated with saliva or blood still goes into the clinical waste bin (orange bag). The recycling bins in each surgery and clearly labelled recycling bins in the waiting rooms and reception/staff areas are emptied daily, into the larger bins outside of the practice, ready for collection by the council recycling service weekly.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Modelled example *continued*

Since introducing the recycling policy the practice has saved money, paying less for waste disposal by incineration as more items are being recycled, and they are aiming to reduce the clinical waste collection from twice to once per week.

The practice staff meet monthly at practice meetings and their 'green' issues are discussed, including any issues they may be having with the waste segregation and disposal and how to resolve these, as well as inviting any new ideas.

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Create a recycling policy and share with staff
- Ensure that your waste disposal contract includes recycling – if necessary switch providers to one that will give you a good rate for recyclables
- Place recycling bins in all areas and label clearly
- Audit waste regularly

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Frimley Park Hospital NHS Foundation Trust Recycling on the Go:
http://map.sustainablehealthcare.org.uk/frimley-park-hospital-nhs-foundation-trust/go-recycling

Oxford University Hospitals NHS Trust recycling in operating theatres:
http://map.sustainablehealthcare.org.uk/oxford-radcliffe-hospitals-nhs-trust/introducing-recycling-operating-theatres

More links:

Less waste, more health. A health professional's guide to reducing waste. (includes "Which waste bin?" sustainability flow chart). Royal College of Physicians, London (2017).
https://www.rcplondon.ac.uk/projects/outputs/less-waste-more-health-health-professionals-guide-reducing-waste

A guide for bin placement in the healthcare environment can be found at:
http://www.greenhealthcare.ie/wp-content/uploads/2014/05/How-To-Undertake-a-Bin-Placement-Survey-revised.pdf

Many types of waste bins are available, by size/colour for use in surgery: e.g. from :
https://www.initial.co.uk/clinical-waste/waste-bins

Duane B, Ramasubbu D, Harford S, Steinbach I, Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4c. *How to:* Reduce paper waste

Why is it important?

Becoming a paper-free practice or reducing your paper usage can have a really positive impact on the environment. Paper has a surprisingly high carbon footprint owing to the carbon emissions produced from its production cycle, accounting for more than 7% of global greenhouse gas emissions.

Scanning, telephone calls, email and text messaging can be used as alternative methods of communication. Moving to digital communication often has many other benefits: saving staff time, improving transfer of information between different parts of the care system and improved flexibility for patient booking, with potentially a reduction in 'failed to attend' appointments.

Where using paper is necessary, printing on both sides of each page, using recycled paper and recycling paper waste can all contribute towards reducing waste, as can regularly monitoring and auditing paper consumption.

You can use a CO2 paper calculator (see below) to calculate the amount of carbon emissions created in the production of your current paper usage- and then again after reducing your paper usage!

vapour- http://environmentalpaper.org/wp-content/uploads/2017/08/paper-discussion-paper-c.pdf

What does sustainable practice look like?

Real life example

West Kent Primary Care Trust saved an estimated **£10,000** per year and **10 tonnes** of carbon by implementing the following Paper Saving Plan:

1.Cut paper use in half by using double-sided photocopying and printing wherever possible.

2.Set duplex printing as default.

3.Chairs of all meeting to request summaries only to be printed of long documents with detail available electronically.

4. Use "Locked Print" where possible so document is only printed when you need it and can retrieve it. This is essential for confidential information.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

What does sustainable practice look like?

Real life example *continued*

5. Use email and voicemail wherever possible instead of memos/letters.

6.Create a secondary storage for used but reusable paper that can be for draft print-outs, faxes and note taking. Reuse paper trays should appear next to printers, fax machines and photocopiers and be a fixture of every desk.

7.Proofread documents carefully on screen before printing them out.

8.If you print a multiple page file and then discover errors, use the print option to only reprint the pages that have been changed.

9.Set the document line spacing to no more than 1.5.

10. Arrange publications so there is a minimum of white space, such as by adjusting margin width.

11. Consider use of text messaging for appointments and reminders

By implementing this plan, the practice both saved money and reduced their carbon emissions.

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- It's easy to develop a paper saving plan like the above. 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Resources

Case studies:

West Kent Paper Policy:
http://map.sustainablehealthcare.org.uk/west-kent-primary-care-trust/paper-policy

Chester Hospital Reuse Recycle Paper:
http://map.sustainablehealthcare.org.uk/countess-chester-hospital-nhs-foundation-trust/reduce-reuse-recycle-paper

More links:

Paper carbon calculator: http://c.environmentalpaper.org/home

Duane B, Ramasubbu D, Harford S, Steinbach I, Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4d. *How to:* Repair and reuse durable goods

Why is it important?

Regular service and repair as needed of machinery and durable goods is a great way to reduce our expenditure, as well as landfill waste, and the associated environmental consequences. Durable goods include furniture, IT, building materials, walking aids and reusable medical devices.

What does sustainable practice look like?

Modelled example

Samit is a principal dentist of a mixed NHS/dental practice, which recently decided to reduce landfill waste as much as possible as part of their 'Reduce, Reuse, Recycle' policy.

As part of this policy, an evaluation was made of all durable goods in the practice, which included dental equipment, computers and printers. The evaluation included when the item was purchased, its policy for best maintenance and a list of repair staff contact details for each item.

All staff were advised of the maintenance policy for items, and advised to report any breakages or concerns about equipment immediately so that early repair could be undertaken.

Since introducing the policy the practice has saved money, by paying less for waste disposal of items and reducing the need to buy more goods.

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

- Create a Reduce-Reuse-Recycle policy including guidance for maintaining equipment
- Buy durable equipment with a long warranty
- Inspect equipment regularly and organise repairs as needed

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Resources

Reduce Reuse Recycle guidelines:
https://www.epa.gov/recycle/reducing-and-reusing-basics

Duane B, Ramasubbu D., Harford S, Steinbach I, Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4e. *How to:* Re-home unwanted items

Why is it important?

Reusing, up-cycling or finding a new home for items a dental practice no longer needs (like furniture or computers) is a great way to save resources and reduce landfill waste. Donations can be made to dental charities, local charity shops, community groups and advertised online.

What does sustainable practice look like?

Modelled example

Jo is a dental therapist at a mixed NHS/dental practice, which recently decided to reduce landfill waste as much as possible as part of their **'Reduce, Reuse, Recycle,'** policy.

As part of this policy, every effort was made to donate and repurpose any dental equipment, furniture, computer paraphernalia and other items, via charity shop donations, donations to dental aid groups and through advertising online through the app/website: www.iLoveFreegle.org.

The practice assessed all their equipment and made a stockpile of equipment that was dated or no longer used regularly, but still perfectly functional. They then contacted their local dental school, whose 4th year Dental Elective students were able to bring this equipment to Uganda, where it is now being used in a mobile dental unit.

Older chairs were donated to the local community centre and since introducing the recycling policy the practice has saved money, by paying less for waste disposal, as well as forging ties with community groups and local dental students.

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

- Create a Reduce-Reuse-Recycle policy
- Check with a charity shop before throwing away reusable items
- Donate dental equipment to charities and 'not for profit,' organisations
- Use 'Freegle' to advertise unwanted items online for local collection

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Resources

https://www.ilovefreegle.org

https://www.gumtree.com/freebies

https://www.dentaid.org/overseas/equipment-donations/

Duane B., Ramasubbu D., Harford S., Steinbach I., Swan J., Croasdale K., Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4f. *How to:* Manage food waste

Why is it important?

Disposing of food waste by landfill has a major environmental impact due to release of methane (a potent greenhouse gas), and is expensive. A study by the Environmental Protection Agency found that 15% landfill waste from Irish healthcare facilities is made up of food waste.

Appropriate management of food waste will return nutrients to the soil again with lower carbon emissions.

There are 3 alternative options for dental practices to consider disposing of food waste:

- **Composting:** can reduce costs in disposing of waste, and improve soil quality. Compost generated could even be sold to generate revenue.

- **Collection by waste collectors.** The food waste can be converted into energy through a process of anaerobic digestion, with the remaining digestate used as a soil conditioner.

- **Worm-farm installation** can improve the efficiency of composting on site. Worms turn organic food waste into nutrient-rich fertiliser.

What does sustainable practice look like?

Modelled example

Carl is a dental nurse at a mixed NHS/dental practice. His practice has implemented a food waste recycling strategy. This is displayed in the practice on their 'Sustainability' notice board and also on the practice's website in their **'Sustainable Practice'** area.

There are food waste recycling bins available in all areas where food is consumed: the kitchen, staff room and outside garden area. There is also a separate bin for compostable food waste (such as raw vegetable matter, teabags) in the kitchen. The bins have clear labels to explain which food can be put into the bins.

The food recycling bins area emptied into a larger food waste bin outside of the practice, ready for weekly collection by the Council recycling service.

The compostable food waste is emptied into the compost bin in the garden which is generating nutrient-rich soil for the plants and flowers in the practice's window boxes and small back garden space.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Modelled example

It is the responsibility of the cleaning staff to empty and rinse out the food recycling and food compost bins each night.

The practice is also looking into installing a worm farm in the garden to produce organic fertiliser, to reduce the costs for maintaining the garden and flower boxes to the practice.

A food bank box has been placed in the staff waiting room for any packaged food items that staff and patients do not want, or wish to donate, also to prevent waste. This is collected by the local food bank team each month.

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Place food waste bins in the kitchen and staff room
- Clearly label bins to show which foods they can take
- Ensure that your waste disposal contract includes food waste recycling - if necessary switch providers
- Consider a compost bin/worm farm if you have a garden

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

You can calculate both the money saved and carbon saved

- **Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

- **Carbon saved:** Carbon calculator
  http://c.environmentalpaper.org/home

Resources

Case studies:

Irish Healthcare food waste audit:
http://www.greenhealthcare.ie/topics/food-waste/

More links:

Information on food waste prevention:
http://www.greenhealthcare.ie/topics/food-waste/

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4g. *How to:* Safely dispose of Medication waste

Why is it important?

The dental team is aware of the need to reduce antibiotic prescribing in line with the growing resistance to antibiotics. Along with antibiotic resistance there is also a growing environmental problem of other pharmaceutical residues entering the environment through improper disposal. Patients not only excrete by-products of medication, but many also dispose of medicines in toilets or sinks. Dissolved in waste-water these can enter rivers and lakes and pass into the food-chain and may adversely affect animals including humans.

Unused medication is also costing the NHS **£300 million each year**[1]. As prescribers of medication, dentists should advise patients on the safe, local recommended method for disposing of unused or expired pharmaceuticals and packaging, by returning them to the dentist for disposal (if the dentist disposes of medication) or more commonly, their pharmacist.

Pharmacies are legally required to accept unwanted medication from patients. There is Government guidance on the safe management of healthcare waste: 'HTM 07-01'.

Respiratory inhalers are particularly polluting because the propellants they contain are powerful greenhouse gases - consider collecting used inhalers for recycling, or signposting the local recycling points for your patients, for example via the **GSK 'Complete the Cycle'** recycling and recovery scheme.[2]

What does sustainable practice look like?

Modelled example

Josh is a practice manager at a mixed NHS/dental practice. His practice has recently reviewed how they dispose of waste medication and Josh has been appointed the lead person to go to for information or advice regarding this.

He has liaised with 3 local pharmacies and information on safe disposal of medication is now clearly displayed on the practice notice board for patients and staff.

Stock is checked each week by the practice dental nursing staff to ensure that medications are used within their time window. This involves a look into the drawers containing dental materials and checking each for the expiry date. Any materials to be used first are placed towards the front of the drawers. Any out-of-date stock is removed and placed in a dedicated box for disposal of medication and expired dental materials.

[1]http://www.medicinewaste.com/help
[2]http://uk.gsk.com/en-gb/responsibility/our-planet/complete-the-cycle/

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Audit stock monthly to ensure medications are used by their expiry dates 
- Contact local pharmacies regarding their disposal of medications and whether they offer this to patients 
- When prescribing medications, advise patients on disposal 
- Provide a box for patients to return unwanted medications 
- Advertise local inhaler recycling points, or become one! 

- **Check stock** in your practice regularly to ensure materials and medications are being used by their expiry dates 
- **Make contact** with your local pharmacies regarding their recommended way of medication disposal and whether they offer a disposal service for patients to return their unused medication 
- **When prescribing medication,** advise patients on the safe, local recommended method for disposing of pharmaceuticals and packaging 
- **Consider having a box** in the practice for staff and patients to dispose of unused medication, which you could take to the pharmacy/disposal service regularly 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Disposal of unwanted medicines information:
https://psnc.org.uk/services-commissioning/essential-services/disposal-of-unwanted-medicines/

Government Guidance: 'Management and disposal of healthcare waste: HTM 07-01':
https://www.gov.uk/government/publications/guidance-on-the-safe-management-of-healthcare-waste

Healthcare waste disposal service:
https://www.initial.co.uk/pharmaceutical-waste/

Pharmaceutical Pollution: FAQ. Health Care Without Harm Europe.
https://noharm-europe.org/content/europe/pharmaceutical-pollution-faqs

Duane B, Ramasubbu D, Harford S, Steinbach I, Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

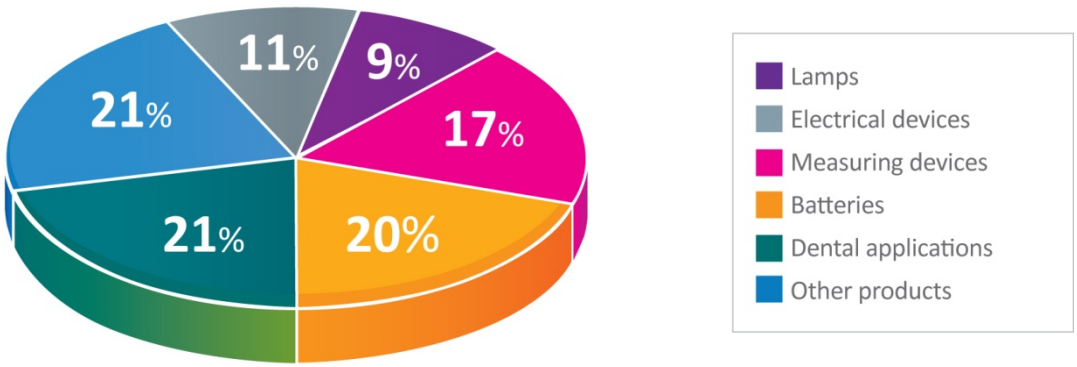
Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4h. *How to:* Minimise the environmental impact from disposal of Dental Amalgam

Why is it important?

The Minamata Treaty aims to reduce the release of mercury into the environment and for dentistry, this involves the phasing out of amalgam use. Mercury can be neurotoxic and teratogenic, it can accumulate as it rises through the food chain and it can also impact the microbiological activity in soil.

Mercury consumption in products, by product category (2010)
Source: AMAP/UNEP 2013



The EU's mercury regulation has the same aim for the territory of the European union, with both documents prescribing a phase-down of the use of dental amalgam for environmental reasons, in line with the domestic circumstances of each country and in tandem with recommendations for prevention programmes and increased research into alternative materials (BDA, 2018).

'Best management practices for the handling and disposal of waste amalgam include the use of chair-side traps, amalgam separators compliant with iso.11143, inspecting and cleaning traps, and using a commercial waste service to recycle or dispose of the amalgam collected. Dental practices in the UK are required by law to use amalgam separators. These have been shown to reduce the amount of mercury in wastewater by 90% in comparison to practices not using separators,' (Mulligan, 2018).

The environmental impacts of alternative dental restoration materials have yet to be fully explored.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

What does sustainable practice look like?

Real life example

Amalgam was banned as a dental restorative material in Norway in 2008 due to environmental considerations. An electronic questionnaire was sent to all dentists in the member register of the Norwegian Dental Association (NTF) one year later, to evaluate dentists' satisfaction with alternative restorative materials and to explore dentists' treatment choices of fractured amalgam restorations.

Replies were obtained from 61.3%. Composite was the preferred restorative material among 99.1% of the dentists. Secondary caries was the most commonly reported cause of failure (72.7%), followed by restoration fractures (25.1%). Longevity of Class II restorations was estimated to be ≥10 years by 45.8% of the dentists, but 71.2% expected even better longevity if the restoration was made with amalgam.

Repair using composite was suggested by 24.9% of the dentists in an amalgam restoration with a fractured cusp. Repair was more often proposed among young dentists ($p < 0.01$), employees in the Public Dental Service (PDS) ($p < 0.01$) and dentists working in counties with low dentist density ($p = 0.03$). There was a tendency towards choosing minimally invasive treatment among dentists who also avoided operative treatment of early approximal lesions ($p < 0.01$).

Norwegian dentists showed positive attitudes towards composite as a restorative material. Most dentists chose minimally- or medium invasive approaches when restoring fractured amalgam restorations.[1]

Modelled example

Gavin is a dentist at a mixed NHS/dental practice, and has been reading about the changes that are being introduced to dentistry as a consequence of the Minimata treaty. With the phasing down of amalgam, he knows the practice needs to make sure their amalgam is pre-encapsulated and that the amalgam separators meet the standards required in each dental surgery.

Gavin includes a course in posterior composite placement as part of his CPD planning, and plans a further one in inlay and onlay placement for the next year. Currently, Gavin can still use amalgam in many cases but he is aware that amalgam may be phased out by 2030 and that other countries do not use it at all.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Inform patients of policy changes via posters, emails or practice websites
- Dental amalgam is only to be used in pre-dosed encapsulated form (use of bulk mercury is prohibited)
- Amalgam separators are mandatory
- Mandatory retention of at least 95% of amalgam particles for separators installed from Jan 2018, and for all separators by 1 January 2021
- Amalgam waste to be collected by authorised waste management company
- No use of amalgam in the treatment of deciduous teeth, children under 15 years and pregnant or breastfeeding women, except when strictly deemed necessary by the practitioner on the ground of specific medical needs of the patient

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

More links:

The Post-Amalgam Era: Norwegian Dentists' Experiences with Composite Resins and Repair of Defective Amalgam Restorations
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4847103/

BDA Dental Amalgam:
https://bda.org/amalgam

Lessons From Countries Phasing down Amalgam Use:
https://wedocs.unep.org/bitstream/handle/20.500.11822/11624/Dental.Amalgam.10mar2016.pages.WEB.pdf?sequence=1&isAllowed=y

The environmental impact of dental amalgam and resin-based composite materials S.Mulligan, G. Kakonyi, K. Moharamzadeh, S. F. Thornton and N. Martin BRITISH DENTAL JOURNAL | VOLUME 224 NO. 7 | APRIL 13 2018
https://www.nature.com/articles/sj.bdj.2018.229

Duane B, Ramasubbu D, Harford S, Steinbach I, Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

[1] SE. Kopperud, FStaxrud, I Espelid,and A Bjørg Tveit. **The Post-Amalgam Era**: Norwegian Dentists' Experiences with Composite Resins and Repair of Defective Amalgam Restorations. Int J Environ Res Public Health. 2016 Apr; 13(4): 441.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

4i. *How to: reduce Water waste*

Why is it important?

Clean water is a valuable but finite resource, essential for not only the provision of healthcare but for the existence of human life. One in eight people globally lack access to safe, clean water. Even in countries where rainfall is plentiful, water treatment and pumping requires significant energy and infrastructure.

Conserving water use can therefore help to save both money, carbon and the use of chemicals in the cleaning process.

In some buildings, it may be possible to install a system to collect rainwater and use this for flushing toilets.

What does sustainable practice look like?

Real life example

At Stobhill Hospital, Glasgow, installation of knee-operated taps for surgical scrubbing resulted in a 53% reduction in water use compared with standard elbow-operated taps.

Modelled example

Natali is a practice manager and at their last team meeting, the team discussed ways to reduce their water use in the dental surgeries and how to promote awareness of water waste in their patient cohort.

She has selected autoclaves and washer-disinfectors which use comparatively less water and advised staff that they should always be full when used.

The practice is considering whether to install motion-sensor taps, but in the meantime, posters beside sinks advise not to leave taps running, and not to over-fill the kettle. Rainwater is collected in a water butt and used to water practice plants. Patients are encouraged to turn off the tap when they are brushing teeth (for at least two minutes twice daily).

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Turn off taps whilst lathering during hand washing.
- Install motion-sensor taps
- Purchase water efficient appliances (e.g. dishwashers and sterilising equipment)
- Do not overfill kettles
- Encourage patients and staff to turn off taps when tooth brushing

You can calculate both the money saved and carbon saved

•**Money saved:** compare costs of waste collection fees and purchasing of goods costs each month before and after implementation

•**Carbon saved:** Carbon calculator
http://c.environmentalpaper.org/home

Resources

Case study:

Somner J. et al. Surgical scrubbing: can we clean up our carbon footprints by washing our hands? Journal of Hospital Infection (2008) 70, 212-215

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources *continued*

More links:

Ecodentistry:

http://ecodentistry.org/green-dentistry/what-is-green-dentistry/save-water/

Colgate:

https://www.colgate.com/en-us/oral-health/basics/brushing-and-flossing/

five-water-conservation-tips-0316

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5141651/

Duane B, Ramasubbu D, Harford S, Steinbach I., Swan J, Croasdale K, Stancliffe R. (in press). Environmental sustainability and waste within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

5. Biodiversity and green space

Why is it important?

Biodiversity refers to the variety of living species which interact with one another to form ecosystems. Ecosystems are dynamic with each species depending upon and impacted by interactions with many others. Humans are no exception! We rely on trees and plants converting carbon dioxide to oxygen, microbes creating fertile soil, insects breaking down waste matter and pollinating crops, predators balancing numbers of prey animals, and so on.

The diversity of species is important, not only because each species impacts on many others, but because it provides resilience against changing conditions caused by factors such as climate, land use and spread of pathogens. Currently, biodiversity is collapsing worldwide (including in the UK), as species are lost due to farming practices, habitat destruction and climate change. This has been described as the 'sixth mass extinction event in geological history'.

Dental practices have the opportunity to protect and enhance local biodiversity through simple changes to their premises and by supporting local food growing.

In this Section… *How to:*

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

- Provide green space in your outdoor area
- Mow lawns less often
- Choose insect-friendly plants
- Choose native plants
- Leave left aside areas (piles of fallen leaves, branches)
- Think about providing insect habitats (bug hotels)
- Avoid pesticides
- Create a green roof or wall
- Plant out the balconies
- Place nest boxes in the roof eaves
- Remove concrete or tarmac and allow ground coverings to be porous and living

Resources

Duane B, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Ballantyne G. (in press). Environmental sustainability and biodiversity within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services: https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

5a. *How to:* Create a wildlife-friendly garden

Why is it important?

Green space within a city encompasses everywhere vegetation grows. Within a dental setting, it applies if the dental practice or surrounding grounds have any kind of green area or garden, which can improve air quality, and provide protection against floods and heat-waves. Gardens are a significant contributor to urban biodiversity by providing food, and shelter could form a complete habitat for certain species of insects and smaller animals.

The Centre for Sustainable Healthcare has developed the **NHS Forest,** a national programme to increase the quality and use of green space on or near to healthcare estates for staff, patients and the local community to use for exercise, rest and relaxation. Natural environments have enormous benefits for people's wellbeing as evidenced by many research studies. For example, hospital patients who have a view of trees from their window have been shown to recover more quickly and to need fewer painkillers than similar patients who can't see trees from their beds.

To maximise the biodiversity in your practice's green space, native plants are the ideal. Fruit such as berries, melon, squash, cucumber, blossoming trees and herbs such as mint, rosemary and sage are all attractive to insects. Vertical structures, built from multiple layers of different plant heights can provide more spaces for wildlife to co-exist. Areas of standing water such as containers filled with water or even larger ponds can also help attract insects, birds and amphibians. Habitats for insects including solitary bees can be encouraged by making insect homes using bamboo canes tied together.

What does sustainable practice look like?

Modelled example

Bill is an associate dentist at a mixed NHS/dental practice, which recently decided to redevelop their small back garden to try and provide a space for staff to enjoy and to encourage local biodiversity.

They consulted with their local wildlife trust and decided to build a small pond, plant a variety of trees and shrubs, grow some beans and provide two bird feeders.

This took some time and involved input from all staff members, who were encouraged to contribute ideas during two staff meetings. The resulting area has become a staff favourite for lunch and there are plans to plant more vegetables during the coming year. Bill regularly hears frogs around the pond area and has noticed several species of finch have begun to nest in the garden.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Modelled example *continued*

During the last staff teambuilding day, they visited local beekeepers and learnt how to collect honey. They are considering adding a hive to the garden and have a team meeting planned to discuss this next week. In the interim, they have decided to sponsor a hive through the British Beekeepers Association

https://www.bbka.org.uk/adopt-a-beehive-info

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

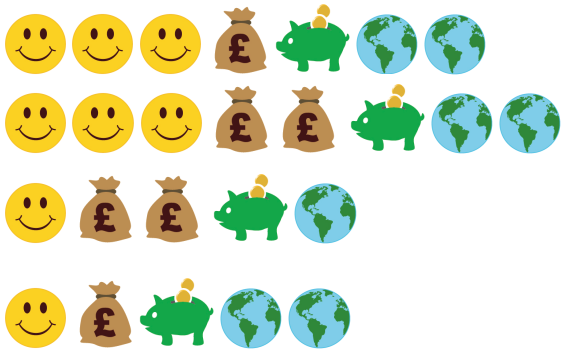
Environmental benefit: Small = Large =

- If you have a garden, consult with local wildlife trusts, beekeepers or local nature partnerships about promoting biodiversity
- Mow lawns less often
- Choose insect-friendly plants
- Choose native plants
- Leave left aside areas (piles of fallen leaves, branches)
- Think about providing insect habitats (bug hotels)
- Place bird food out in winter

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

- Avoid pesticides
- Plant out the balconies
- Place nest boxes in the roof eaves
- Support staff to volunteer with local conservation organisations



Resources

Centre for Sustainable Healthcare and Green space:
https://sustainablehealthcare.org.uk/what-we-do/green-space-and-health

NHS forest video:
https://www.youtube.com/watch?v=g5bD5AGetbc

Royal Horticultural Society- encouraging wildlife in your garden
https://www.rhs.org.uk/science/conservation-biodiversity/wildlife/encourage-wildlife-to-your-garden

Beekeeping in urban settings
http://www.urbanbees.co.uk/faq/faq.htm

Duane B, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Ballantyne G.(in press). Environmental sustainability and biodiversity within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

5b. *How to:* Support local food growing

Why is it important?

Supporting local food growing can be an opportunity for all dental team members to engage with the local community, learn more about sustainability and to contribute positively to lowering carbon emissions.

Growing food onsite in a practice garden or obtaining an allotment to be used by practice staff or patients offers the opportunity to learn about food from farm to fork, and can also help reduce emissions that would have been generated by transporting such items.

In larger facilities like hospitals, encouraging staff to support local food growers and producers has a positive effect on the local economy, as well as reducing the miles our food will have to travel and the associated carbon cost. This could be achieved by selling local produce in the staff canteen.

What does sustainable practice look like?

Real life example

Hampshire Partnerships Trusts' project **'Procurement of Local Food,'** involved investing in a project manager from the 'Food Matters,' a not-for-profit organisation, and providing local food seminars for all chefs working in the Trust, allowing them the opportunity to try local food products and to discuss any perceived barriers to using local ingredients. Local food days were also organised at several hospitals.

Modelled example

Inge is a receptionist at a mixed NHS/dental practice, and is passionate about local and seasonal food. She has her own allotment and organised a staff visit to it, where she showed team members what she is growing and she made them a plant-based dinner afterwards using a variety of vegetables and herbs she had grown herself.

She discussed supporting local food growers and suppliers and organised a pot luck staff lunch, where each staff member brought a dish created using local ingredients, such as honey and strawberries, with organic cream from a local dairy. She planted some boxes with basil, cress and tomatoes to grow in the windows of the dental practice, and rotates what is growing in them depending on the season.

Inge also has provided some information on **'Grow your Own,'** on the dental practice website and via posters in the waiting room. She is hoping that at the next staff volunteer day, they can volunteer in the local community garden alongside some of their patients, and she recently included this on the practice e-newsletter.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- If you have a garden, consult with local wildlife trusts, beekeepers or local nature partnerships on promoting biodiversity alongside growing fruit and vegetables
- Avoid pesticides
- Investing in an allotment can be a team building exercise for staff and encourage gentle exercise
- Invite patients to participate in practice gardens and initiatives, and ask them for feedback on projects they would like to be involved in
- If you have limited space or no garden, consider planting herbs, tomatoes and chillies in window boxes or in pots in the reception area. Discuss amongst staff which plants would be best and organise a watering and maintenance rot
- In larger settings, ensure that food procurement supports local suppliers, and use seasonal produce to reduce food miles, whilst avoiding the need for heated greenhouses.
- Support staff to volunteer with local community gardens or allotments and let patients know about it

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Hampshire Partnership Trust: Procurement of local food
http://map.sustainablehealthcare.org.uk/hampshire-partnerships-nhs-trust/procurement-local-food

More links:

Centre for Sustainable Healthcare and Green space:
https://sustainablehealthcare.org.uk/what-we-do/green-space-and-health

How to grow...
https://www.growfruitandveg.co.uk/

Grow it yourself (social enterprise)
https://giy.ie/

Duane B, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Ballantyne G.(in press). Environmental sustainability and biodiversity within the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

5c. *How to:* Green the built environment

Why is it important?

There are a number of ways in which the built environment can be designed or adapted to reduce the impact of growing urban sprawl on local wildlife. These features include green roofs, green walls, modified brick and roof tiles, balconies, and roof eaves, all of which can support a range of flora and fauna.

This is crucial as, within the UK, 15% of around 8000 species are facing extinction, with David Attenborough suggesting that the UK has lost more nature long term than the global average, making the UK one of the most nature-depleted countries in the world. Scientists identify many reasons for the reduction in the world's insect populations, notably the use of pesticides, the spread of monoculture crops, urbanization and habitat destruction.

What does sustainable practice look like?

Real life example

Cola's Rail depot in Rugby have had a living wall and roof installed by company 'Sky Garden.' The wall has an irrigation system and is free draining onto a border below. The living roof is made from a sedum blanket which flowers beautifully in spring. This process has completely transformed this urban space. There are multiple case studies of living walls and roofs installed in various settings on Sky Garden's website.

Modelled example

Rachel is a receptionist at a mixed NHS/private dental practice, which is located in a city centre. She is helping the practice owner maximise the space they have to promote biodiversity, and has suggested employing green walls, and using their balcony and window areas to support diverse plant life.

Green walls are vertical systems of green foliage. They can be found on any type of vertical surface, attached to buildings directly or free-standing. Many dental practices, even those within apartment or office buildings may have balconies. These can contain a number of small plants including herbs, flowering plants or grasses, and Rachel is hoping to grow a variety of herbs on hers.

A **green roof,** also known as a **'living roof,'** or **'brown roof/bio-diverse roof,'** is an affordable option to improve the sustainability of a building. They are designed to allow growth of a number of different vegetations and can be created by rolling out matting or wildflower turf, or can be more specialised. The roof structure can be quite low maintenance especially if stress-tolerant species are used, so Rachel thinks this would work well in their building.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Create a green roof or green wall
- Plant out the balconies
- Place nest boxes in the roof eaves
- Remove concrete or tarmac and allow ground coverings to be porous and living

Resources

Case studies

Sky Garden at Cola's Rail, Rugby:
http://ww2.sky-garden.co.uk/case-studies/colas-rail-green-wall.php

More links

WHO Urban green space:
http://www.who.int/sustainable-development/cities/health-risks/urban-green-space/er

Centre for Sustainable Healthcare and Green space:
https://sustainablehealthcare.org.uk/what-we-do/green-space-and-health

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

6. Measuring and embedding Sustainability

Why is it important?

The dental team needs to understand the need for change and feel inspired to act. Part of achieving this is trying to assist the team in thinking about sustainability not as a separate entity but as integral to successful everyday functioning of the dental practice, and to patients' overall health.

A formal sustainability plan with actions and outcome measures can signal that the practice is taking this agenda seriously and measuring progress. This then needs to be embedded into general management processes (such as the routine staff meetings) to ensure that momentum is not lost as other issues arise.

All staff and patients should be encouraged to share their values and solutions to support the practice in becoming more sustainable.

In this section... *How to:*

6a. Communicate your vision to staff and patients
6b. Develop a sustainability practice policy
6c. Measure and evaluate sustainable changes

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Create a practice policy on sustainability 
- Incorporate sustainability into your staff induction 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions *continued*

- Provide education sessions for your staff on sustainability

- Include sustainability in staff meetings

- Do some quick sustainability changes to build excitement and momentum

- Measure what your practice has been doing

- Communicate the vision to your staff and patients

Resources

Duane B, Croasdale K, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Vadher D. (in press). Environmental Sustainability: Measuring and embedding sustainable practice into the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

6a. *How to:* Communicate your sustainability vision to staff and patients

Why is it important?

Communicating your practice's sustainability vision and how it relates to your practice can increase awareness and support amongst your staff, patients, other dental practices and local community.

The vision can be communicated both internally and externally. It could include putting sustainability material within the waiting room or on the practice's website or social media pages, highlighting the steps that the practice is taking and progress made.

Sustainability should be included in all staff induction packs, with reference to the sustainability vision and policy within practice handbooks.
Information could include information on the Top 10 Tips (see below), and general information on sustainability (e.g. carbon emissions of active travel, significant carbon emissions associated with dentistry). Staff could also be asked to complete the Sustainable Dentistry e-learning session (see link below). With such a process, new staff are more likely to consider sustainability as an integral part of their role.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

What does sustainable practice look like?

Real life example

North West London Hospitals NHS Trust has a travel plan policy which is successfully encouraging healthy and sustainable modes of transport for staff, outpatients and visitors to its sites at Northwick Park/St Mark's (NPSM) and Central Middlesex (CMH) hospitals. They want to promote the London Car Share system which they have joined and have developed a project proposal to design and produce leaflets, posters, promotional material and webpage do so. The estimated implementation costs are £500.

Actions

KEY:

Implementation: Easy =  Less Easy = 

Investment Cost: Low =  High = 

Financial return on Investment (ROI): Low =  High = 

Environmental benefit: Small =  Large = 

- Incorporate sustainability into your staff induction/training 
- Put up a sustainability notice/info board 
- Display posters, photos, information leaflets and guides relating to sustainability within your practice 
- Communicate the practice vision and policy on your practice website and social media pages 

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

North West London Hospitals NHS Trust:
http://map.sustainablehealthcare.org.uk/making-car-share-message-more-attractive

More links:

Top ten tips for sustainable dentistry poster:
https://networks.sustainablehealthcare.org.uk/networks/dental-susnet/10-top-tips- sustainable-dentistry-poster

E-lfH Sustainable Dentistry **e-learning resource**:
https://networks.sustainablehealthcare.org.uk/networks/dental-susnet/sustainable- dentistry-e-learning-module-free-cpd

The Best Ways to Communicate Your Organisation's Vision:
https://www.ccl.org/multimedia/podcast/communicating-the-vision/

Duane B, Croasdale K, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Vadher D. (in press). Environmental Sustainability: Measuring and embedding sustainable practice into the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

6b. *How to:* Develop a sustainability practice policy

Why is it important?

A practice policy or plan can be quite simple for a smaller practice, but a larger practice may require more complex documents. Although not a requirement for dental practices, larger healthcare organisations are encouraged to have Sustainable Development Management Plans. These plans are an indicator in the Public Health Outcomes Framework.

The policy needs to be practice specific and will contain an action plan with **SMART** targets with allocated staff members responsible for specific actions. The practice needs to consider the resources for implementing the plan. Sometimes these may require short-term financial investment for longer-term financial gains.

What does sustainable practice look like?

Modelled example

Leila is an associate dentist, and currently is the practice lead for sustainability. She is developing a practice policy with help and input from her colleagues. After consultation, she has decided to include:

- A process to manage communications raising awareness about sustainability in a network of dental practices
- A process to collect feedback, ideas and offers from patients on sustainability
- A process for the practice to engage staff, patients and visitors
- A process to encourage patients and staff to travel sustainably
- Processes to manage waste, energy and biodiversity

For each process, a staff member will be responsible for implementing and evaluating the associated actions. They used the relevant tips from this guide and decided how each could be best implemented in the context of the practice.

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Assess as a team where energy and carbon savings can be made
- Review the Actions for these areas and discuss how they can be adapted for the size of your dental practice.
- Put together a practice sustainability plan, with an emphasis on simple and achievable goals.
- Make some quick sustainability changes to build excitement and momentum
- Evaluate your plan and goals every 6 months, assessing where improvements can be made.
- Calculate your savings both in money and carbon and disseminate this information.

Resources

Sustainable Development Management Plans:
https://www.sduhealth.org.uk/delivery/plan.aspx

Duane B, Croasdale K, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Vadher D. (in press). Environmental Sustainability: Measuring and embedding sustainable practice into the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

6c. *How to:* Measure and evaluate sustainable changes

Why is it important?

Measuring:

Embedding sustainability into a healthcare setting is a quality improvement process. An integral part of quality improvement is the use of measurement. Measurements could be used in the future for dental practices to benchmark their sustainability performance against their colleagues, and it is possible that sustainability metrics could also be used in future commissioning decisions.

Indicators recorded in order to measure sustainability within the dental practice should be SMART: Specific (the measure should quantify an important result e.g. kWh of electricity), Measurable, Achievable, Relevant (i.e. related to sustainability), and Time specific (e.g. over one month, one year etc.)

Carbon Footprint:

There are no ready-made carbon footprint calculators for dental practices but by collecting electricity and gas use (KWh), a sample of patient and staff travel, and procurement (purchases) information, a practice can capture a significant part of its carbon emissions. The carbon footprint is calculated by converting this data into emissions using DEFRA or SDU figures used in the Scottish and English Carbon footprint studies (see Resources below).

Simple to understand elements of sustainability could be displayed in a sustainability electronic folder and on patient information boards within the dental practice.

Evaluating:

Evaluation is the process of assessing or determining the significance of an action. Many dental practices may wish to evaluate their sustainability indicators informally e.g. comparing energy use, or waste use from one given period to another.

A more formal evaluation can be performed quantitatively (e.g. using data) or qualitatively (e.g. using non data information such as descriptions of sustainability improvements). Evaluation can either be process (how an outcome was achieved) or outcome based (the actual change, or how effective the program was in producing change).

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

What does sustainable practice look like?

Real life example

The **'Green Impact audit tool'** for dental practices was developed by the postgraduate dental department of the University of Bristol and piloted in 2014-15, supported by the National Union of Students (NUS). It enrolled dental practices in the South West to implement sustainable changes using the tool, led by Foundation Dentists in their practices. 50 practices were engaged, 42 of which submitted a toolkit and were audited remotely by trained students. Changes involving waste management and recycling, printing and photocopying and energy awareness and use were made; and energy, carbon and financial savings were demonstrated.

Calculations to estimate the impact of the practices' combined actions on both carbon reductions and financial savings were carried out using the **Carbon Trust Empower Calculator**. Through just two of the actions (printing double-sided and switching off lights and equipment) approximately **£11,035 and 53 tonnes of carbon** was saved.

An estimated **456** people had been reached by practices implementing a lighting and equipment responsibility plan, potentially saving **91,309 kg CO2 and £14,289.**
531 people were reached by practices raising awareness of recycling, potentially saving up to an estimated **39,592 kg CO2 and £10,640** on resource costs in that year.

Modelled example

Sonya is a dental practice owner. She has worked with her team to implement sustainable changes in the practice and wanted to evaluate the changes. She has created a template to evaluate the process and outcomes achieved, which will be used as part of a sustainability audit. Each dental team member in the practice will lead on a part of the audit for each indicator:

Indicator	Process evaluation	Outcome evaluation
Energy use	Insulation installed LED lights changed Zero emissions supplier now used	Energy use change in kWh
Travel	Travel policy Use of teledentistry Use of electronic referrals Secure cycleparking, showers	Number of appointments Patient or staff travel (using patient or staff questionnaires) reduced, increased active travel etc.
Procurement	Use of suppliers questionnaire	Amount spent per patient on procurement

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Modelled example *continued*

Indicator	Process evaluation	Outcome evaluation
Waste	Waste audit Waste policy	Amount of waste sent under each category
Biodiversity	List of actions undertaken	Increase in biodiversity e.g. a particular bird species
Embedding sustainability	Appointing a lead Staff education Practice policy	Staff knowledge / behaviours

Actions

KEY:

Implementation: Easy = Less Easy =

Investment Cost: Low = High =

Financial return on Investment (ROI): Low = High =

Environmental benefit: Small = Large =

- Choose indicators to measure sustainable changes in your practice, both qualitative and quantitative
- Ensure your indicators are **SMART**
- Collect data e.g. from utilities statements, procurement records or travel survey
- Evaluate progress against your indicators and involve the whole team
- Display sustainability progress on practice notice boards and website

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Resources

Case studies:

Green Impact Tool:
https://sustainability.nus.org.uk/green-impact/articles/how-green-impact-works-in- healthcare

More links:

Carbon Trust Carbon Footprint Software:

https://www.carbontrust.com/client-services/advice/footprinting/carbon-footprint- software/#footprintmanager

Sustainable Development Unit measurement metrics:
https://www.sduhealth.org.uk/areas-of-focus/metrics.aspx

Dental Carbon emissions studies using DEFRA & SDU footprint figures:
Duane B, Hyland J, Rowan JS, Archibald B. Taking a bite out of Scotland's dental carbon emissions in the transition to a low carbon future. *Public Health* 2012; **126(9)**: 770-777

Carbon modelling within dentistry: towards a sustainable future. Public Health England and Centre for Sustainable Healthcare (2018)
www.gov.uk/government/publications/carbon-modelling-within-dentistry-towards- a-sustainable-future

Duane B, Croasdale K, Ramasubbu D, Harford S, Steinbach I, Stancliffe R, Vadher D. (in press). Environmental Sustainability: Measuring and embedding sustainable practice into the dental practice. British Dental Journal.

Dental Susnet, online network for improving the sustainability of dental services:
https://networks.sustainablehealthcare.org.uk/dental-susnet

Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer - Centre for Sustainable Healthcare (2018)

Sustainable Dentistry

How to Guide for Dental Practices

Authors:
Sara Harford, Darshini Ramasubbu, Brett Duane, Frances Mortimer,
Centre for Sustainable Healthcare (2018)

CENTRE FOR SUSTAINABLE HEALTHCARE
Cranbrook House 287-291 Banbury Road Oxford OX2 7JQ
T: +44 (0)1865 515811
www.sustainablehealthcare.org.uk

CENTRE *for* SUSTAINABLE HEALTHCARE
inspire • empower • transform