

Will dentistry ever be 'green' again?



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Introduction

In December 2018, the *BDJ* received a letter to the editor on green dentistry. In it, the author wrote: 'Sir, we read your recent articles on the topic of 'green dentistry' with great interest. They clearly demonstrated the need for the entire dental profession to do their bit to make the world a greener, and thereby, a safer place to be. Indeed, these papers inspired me to implement changes in my own practice with the goal of making it the 'Greenest in the UK'.

Changes to our practice can be seen as soon as patients enter the door, pass through the waiting area, and go right through to the dental chair in the surgery. Our first step was to find the right products - green chairs, desks and carpets were easily installed in the waiting area but the surgery and infection control room proved trickier. In some cases, we had to create the products from scratch. This involved a lot of paint.¹

Of course, the letter was entirely fictional as part of the seasonal good humour edition. I mention it not because it's December, or a reader painted their practice green, but because I distinctly recall the growing buzz about dentistry's move to being green and sustainable at the time. While some feel there may only be limited scope to improve dentistry's footprint, improvements were being made, which for many makes the current working environment even more upsetting.

Necessary precautions

At the height of the pandemic's first wave, and when urgent care centres were popping up across the country, the British Dental



Key points

- Pandemic has set dentistry back in its quest to be more sustainable
- Assessing the viability of ongoing PPE requirements
- Ways to improve



Association created advice on how to stay safe in what was ‘the new day’ in the life of a dental team.² In it, the advice read:

1. **Getting to work**

- ◆ Wear clean clothes
- ◆ Put your phone in a plastic bag
- ◆ Pack two pillowcases and use a washable bag like a rucksack

2. **At work**

- ◆ Change into clinical work wear
- ◆ Put your home clothes into one pillowcase
- ◆ Prior to clinical activity put on appropriate PPE, including doffing and donning procedures as appropriate

3. **Leaving work**

- ◆ Shower if possible
- ◆ Put your work clothes in the other pillowcase
- ◆ Change into the clothes you had on in the morning

4. **Arriving home**

- ◆ Clean down your car where your hands came into contact with it
- ◆ Enter your home with minimal contact with the premises
- ◆ Wipe down the door
- ◆ Place the pillowcase with all work clothes in the washing machine
- ◆ Machine wash all your clothes and pillowcases at 40° plus
- ◆ Wipe down the machine.

‘However, it is patently obvious these measures were absolutely not eco-friendly, and even Swampy would realise following the public health guidance was necessary’

All of the above was for one day. *One day!* While time-consuming and laborious, they were absolutely necessary to ensure the safety of the workforce. However, it is patently obvious these measures were absolutely not eco-friendly, and even Swampy would realise following the public health guidance was necessary. Dentistry’s quest to improve its sustainability was put on hold – and for good reason.

Fast forward to today and the opportunities to reduce plastic consumption, PPE waste, reuse, recycle and improve the carbon

footprint associated with the profession is in exactly the same place. Enhanced levels of personal protective equipment (PPE) are still required for aerosol generating procedures (AGPs), single-use plastic is still very much front and centre and as for carbon footprint, both patient and staff attitudes to using public transport have torpedoed any progress the profession saw in the build-up to 2020. For staff, car sharing was always suggested as an appropriate means of reducing carbon footprint, but for now being in an enclosed space with someone outside of your bubble makes many uncomfortable. For patients, using public transport to resume their former routines is also an uncomfortable thought for many, and logic would suggest this spreads to non-essential healthcare. While both of these revolve around an individual's assessment of the associated risks, many other areas are not a choice.

Take the PPE requirements listed in Table 1 and Table 2. The guidance – updated on 15 April 2021 – is strikingly similar to that issued in August 2020 and categorically states ‘patient care equipment should be single-use items where practicable’.³ Yet while no-one is arguing these continued high levels help to keep patients and practitioners safe, some experts believe with the increasing knowledge of how COVID-19 is transmitted, standard operating procedures (SOP) haven't evolved, meaning items such as plastic aprons are superfluous yet still recommended, contributing to much of the in-clinic waste generated.

What has changed

In 2019, The NHS Long Term Plan stated ‘By 2020, we aim to reduce the NHS’ carbon footprint by a third from 2007 levels’.⁵ In 2017, research suggested that the carbon footprint of the NHS dental service was 675 kilotonnes carbon dioxide equivalents (CO₂e). Examinations contributed the highest proportion to this footprint (27.1%) followed by scale and polish (13.4%) and amalgam/composite restorations (19.3%). From an emissions perspective, nearly two thirds (64.5%) of emissions related to travel (staff and patient travel), 19% procurement and 15.3% related to energy use.⁶ Since, confirmation that amalgam is being phased down, and lockdowns worldwide have drastically reduced CO₂ emissions. Look at China – one commentator estimated China's carbon emissions fell by around 25% over a four-week period when they were locked down and movement restricted.⁷ There is no

Table 1 Personal protective equipment: patients/individuals with no COVID-19 symptoms and no test results³

| PPE required by type of transmission/exposure | Disposable gloves | Disposable apron/ gown | Face masks | Eye/face protection (visor*) |
|---|-------------------|---|-------------------------------------|------------------------------|
| Droplet/Contact PPE for direct patient care <2 metres | Single use | Single use apron (gown required if risk of spraying/ splashing) | FRSM Type IIR† | Single use or re-usable* |
| Airborne PPE (When undertaking or if AGPs are likely) | Single use | Single use apron or gown | FFP3†† or Respirator/ Hood for AGPs | Single use or re-usable |

† FRSM can be worn sessionally if providing care for COVID-19 cohorted patients/individuals.
 ††FFP3 can be worn sessionally (includes eye/face protection) in high risk areas where AGPs are undertaken for COVID-19 cohorted patients/individuals.
 *Risk assess and use if required for care procedure/task where anticipated blood/body fluids spraying/ splashes below single use/reusable.

Table 2 Personal protective equipment (PPE): suspected/confirmed COVID-19 patient/ individual⁴

| PPE required by type of transmission/exposure | Disposable gloves | Disposable apron/ gown | Face masks | Eye/face protection (visor) |
|---|-------------------|--|--|-----------------------------|
| Droplet/Contact PPE | Single use | Single use apron and gown if risk of spraying / splashing) | FRSM Type IIR for direct patient care† | Single use or re-usable |
| Airborne PPE (When undertaking or if AGPs are likely) | Single use | Single use gown | FFP3†† or Hood for AGPs | Single use or re-usable |

† FRSM can be worn sessionally if providing care for COVID-19 cohorted patients/individuals.
 ††FFP3 can be worn sessionally (includes eye/face protection) in high risk areas where AGPs are undertaken for COVID-19 cohorted patients/individuals.
 NB. Consideration may need to be given to the application of airborne precautions where the number of cases of COVID-19 requiring AGPs increases and patients/individuals cannot be managed in single or isolation rooms.

reason to believe the first and subsequent raft of lockdowns in the UK would not have a similar impact, while adversely affecting higher rates of energy use.

It is ‘procurement’ – classed in the paper as the products and services dental clinics buy – that really highlights the scale of the change and associated damage. According to the Department of Health and Social Care (DHSC), the average monthly number of PPE items distributed for use by health and social care services skyrocketed throughout the pandemic. While there is no breakdown of which service used what amount, data show:⁸

- Distribution of aprons increased by approximately 550% from 10 to 15 million units per month pre-COVID-19 to 70 to 80 million units per month during COVID-19
- Distribution of clinical waste bags increased by approximately 170% from 4 to 5 million units per month pre-COVID-19 to 7 to 8 million units per month during COVID-19
- Distribution of eye protection increased by approximately 17,000% from 40 to 45 thousand units per month pre-COVID-19 to 7 to 8 million units per month during COVID-19

- Distribution of masks increased by approximately 4,700% from 1 to 2 million units per month pre-COVID-19 to 85 to 90 million units per month during COVID-19
- Distribution of gloves increased by approximately 200% from 145 to 150 million units per month pre-COVID-19 to 310 to 320 million units per month during COVID-19
- Distribution of gowns increased by approximately 1,600% from 60 to 65 thousand units per month pre-COVID-19 to 1 to 2 million units per month during COVID-19
- Distribution of hand hygiene increased by approximately 950% from 170 to 175 thousand units per month pre-COVID-19 to 1 to 2 million units per month during COVID-19.

Recent research attempted to quantify the environmental impact of personal protective equipment distributed for use by the health and social care system to control the spread of COVID-19. Their results concluded the carbon footprint of PPE distributed during the study period totalled 106,478 tonnes

CO₂e, with the greatest contributions from gloves, aprons, face shields and Type IIR surgical masks, while impact on 'resource depletion' was costed at £9.3m.⁹

Given no-one knows how, if or when the pandemic will be no more, these figures are not even remotely sustainable – not just in the UK, but on a global scale. The demand for PPE is expected to stay at an elevated level, with an estimated annual increase of 20% in the production of single use face masks between 2020 and 2025.¹⁰ Perhaps that is why DHSC formally extended the provision of free COVID-19 PPE until 31 March 2022. In making this decision, DHSC said they have considered the 'likely trajectory of the pandemic, the roll-out of the national vaccination programme and have engaged with a broad range of stakeholders'.

While welcome news, it goes without saying that, after the planned relaxation of restrictions, any further mutations and resulting spikes will undoubtedly put pressure on global supply chains, which in turn drives costs up. At the height of the first wave, PPE shortages meant the cost of treating each patient increased by up to 6,000%. Costs for PPE per patient appointment were 35p to 45p pre-pandemic, but some reports put that figure at £20 to £30 – depending on exact PPE requirements and usage – as a result of those shortages. Some practices were able to swallow the additional expense, others weren't. Temporary PPE charges were added to procedures, some dependant on whether they were AGPs or not. At a time where patient flow is attempting to recover, any possibility of additional outgoings for high street dentistry and Trust budgets already at stretching point should be treated with caution.

Bringing about change

In 2019, YouGov data revealed that the public was more concerned about the environment than ever before. A quarter (27%) of Britons cited the environment in their top three issues facing the country, putting it behind only Brexit (67%) and health (32%) at the time.¹¹ Of more interest was the 45% of 18-24-year-olds saying environmental issues were one of the nation's most pressing concerns, making it their second biggest concern behind Brexit. One year later, the sentiment was echoed by Ifrah Khan, who wrote in *BDJ Student*: 'Concern among our generation for the future is growing - as we know, the long term prognosis of the world we live in isn't great. Dentistry has an important

opportunity to address the sustainability of services and set an example for the rest of the NHS and for the wider profession. For students and dentists alike, COVID-19 has changed much of that. With patient priorities changing, potentially meaning that routine check-ups are out the window for the time being, chances to create ways to reduce, reuse and recycle are slim.¹²

I highlight these figures because change does not happen overnight. The UK's target is to bring all greenhouse gas emissions to net zero by 2050 – it will be the current cohort of dental students and beyond who will drive changes through in conjunction with changes to the dental landscape. The Centre for Sustainable Healthcare identified four principles to make medical care more sustainable:¹³

1. Prevention

Disease prevention and health promotion should be the centre of patient care. By understanding and changing the underlying causes of disease, we can prevent disease occurring. Where possible, interventions should capture environmental benefits of healthy lifestyles.

2. Self care

Patient education and empowerment enables patients to take a greater role in managing their own health. Informing patients how to prevent disease progression will enable them to feel empowered. Clinical teams can also work together, and with the patient, to reduce duplication of care.

3. Lean pathways

This is the process of improving clinical decision making, avoiding interventions which are not effective or costly, and therefore reducing their environmental impact. Increasing efficiencies, for example with referral pathways, also reduces environmental impact.

4. Low carbon alternatives

Using medical technologies and treatments with a lower environmental impact, where possible.

In reality, points one and two rely on the need for dental contract reform to happen. If I had £1 for every time I wrote or read about how important this was to the sustainability of dentistry for future professionals, I'd be very rich indeed. As our response to the

pandemic changes, so do our needs. In fact, last year researchers described prevention as the 'single most important factor in improving sustainability in dentistry'.¹⁴ The research – carried out pre-pandemic – went on to say: 'Encouraging a low sugar diet and efficient oral hygiene will reduce the clinical burden currently placed on the dental provision. Any changes to the current dental contract should aim to transform services through a prevention focused approach.' If prevention is that important to the future of dentistry – as the FDI's *Sustainability in Dentistry* project demonstrated – it's simply another reason to wonder why plastic decomposes quicker than contract reform is being implemented to ensure prevention is at the heart of the profession.

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For lean pathways and low carbon alternatives, the pandemic may have inadvertently opened up a new world for dental teams across the profession. The digitalisation of dentistry theoretically means better treatment. Laser guided surgery cuts down on the potential for mistakes. Advances in restorative dentistry mean that implant solutions are becoming more and more sophisticated – quite often to fit the challenging nature of the patient's demands. Milling machines can do their job within an hour, providing the patient with everything they need in a single visit. This example of how technology can be successfully integrated is a template of how dentistry can accelerate its recovery.

Pre-pandemic, how did the profession view video consultations? I recall a conversation with one corporate employee last year who suggested they saw three years' worth of technological improvement in three weeks at the start of the pandemic. They had no choice – if they didn't, they wouldn't survive. Teledentistry had to take on additional significance to provide both patients and practitioners with safe – and viable – options for getting treatment. Yes, it's scope is limited – research has pointed to constraints related to infrastructure, such as,

poor internet access, shortage of hardware, lack of training, lack of technical support and expertise,¹⁵ but the profession has to embrace the challenges posed and overcome them. Dentistry can utilise three of the four sub-units of teledentistry the same research identified: teleconsultation, teletriage and telemonitoring.

It is the fourth of these sub-units that causes the most consternation. Telediagnosis is the one area that would close the circle and enable fuller adaptation of teledentistry, therefore improving dentistry's green footprint. In assessing how the profession can accelerate a move towards a green, sustainable future, researchers (pre-pandemic) identified that: 'Reducing the number of patient appointments and use of appropriate recall intervals are also required. Remote consultations are not as applicable in dentistry as they are in medicine owing to the interventional nature of diagnosis and treatment.'¹⁴ It is here the profession will always have little to no scope for green development, and I cannot see how that will ever change.

Warning signs on the horizon

It is clear that COVID-19 has changed society for good. Even as I write and relaxations are forecast to continue as planned, talk is already turning towards the wearing of masks once 21 June rolls around. While society may have to grapple with whether they want to or whether they should continue wearing face masks, for dental professionals, there are some I have spoken to who believe the evidence of the risks of airborne transmission – which has led the government to now emphasise the importance of ventilation – means enhanced levels of PPE are here to stay. Writing in the *British Medical Journal*, a team of respiratory experts argued COVID-19 is most likely to transmit between people at close range through inhalation, rather than through surface contact or longer range airborne routes (although still can also be responsible for transmission).¹⁶ The authors go on to warn there needs to be added emphasis on ventilation because the tiniest suspended particles can remain in the air for hours and these are an important route of transmission.

It was an emphasis that was apparently already on the radar of the Scottish Dental Clinical Effectiveness Programme (SDCEP), who on 30 April released 'Ventilation Information for Dentistry',¹⁷ providing a summary of information on ventilation to

mitigate the risk of COVID-19 transmission, with a focus on advice and information that has relevance for dental facilities. While the document is not guidance and does not address all aspects of queries surrounding ventilation, the report states is 'reflects the current available information'. Dentistry has known for some time about the impact of modes of transmission; just ask anyone struggling with fallow times. This update is another warning shot across the bow of every dental practitioner performing an AGP. It's another sure-fire sign enhanced PPE is here to stay. For how long is anyone's guess, but at this rate the only way dentistry is going to get back on the road to being green again is to follow Dr B Greene and pick up a tin of paint. ♦

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