Introduction
Designed to Smile (D2S) is a national programme to improve the oral health of children in Wales. It is funded by the Welsh Government and delivered by the National Health Service, in partnership with nurseries, schools and other professional groups working towards a common aim: to prevent childhood dental disease.1 This school year (2019-20), the programme is celebrating its 10th anniversary and the positive impact it has achieved.

Background
In the 2000s, with recognition of the widening gaps between the oral health of children from the most and least well-off families in Wales, the Welsh Government announced its commitment to tackling inequalities and to improving the oral health of children.2 At that time, over 50% of five-year-old children in Wales had experienced dental decay.2

The National Oral Health Action Plan for Wales (2007) included the development of a National Child Oral Health Improvement Programme, namely Designed to Smile, aimed at implementing sustainable toothbrushing programmes in school and nurseries, providing free toothbrushes and fluoride toothpaste to participating children and additional fluoride varnish and fissure sealant programmes.2

In 2008, the D2S Programme was piloted in North and South East Wales, before being expanded to involve all Health Boards from September 2009. Responsibility for the implementation of D2S was allocated to the Community Dental Services, who organise and co-ordinate all aspects of the programme, with strategic support from Dental Public Health.

In light of emerging epidemiological1 and research evidence,4 and in order to ensure that the programme continued to target those children most at risk of dental decay, Welsh Government initiated a refocus of D2S in 2017.5 This involved realigning the programme to the 0-5-year-old age-group, for a greater focus on the very youngest children with renewed collaboration with early years health professionals as part of the new Healthy Child Wales Programme.6

Structure and delivery of the current D2S programme
Designed to Smile involves:
1. A universal preventative programme for children from birth: this involves a wide range of professionals, including health visitors and other early years services. The aims are to help start good habits early by giving advice to families with young children, providing toothbrushes and

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Aoife Nic Iomhair,1 Mary Wilson2 and Maria Zeta Morgan3 outline the structure of the DCP-led oral health programme Designed to Smile in Wales, and reflect on its success.
toothpaste, and encouraging regular dental practice attendance.

2. A targeted preventative programme for nursery and primary school children: this involves delivery of supervised toothbrushing and fluoride varnish programmes for children to help protect teeth against decay, and provision of oral health education resources. This element focuses on schools and nurseries within the three most deprived quintiles of the Welsh Index of Multiple Deprivation (WIMD).

Table 1 shows the current D2S programme model across the different age groups and settings involved.

During the 2018/19 academic year, 1,398 primary schools and nurseries, involving 90,977 children, participated in D2S daily toothbrushing schemes, while 44,217 of those children also had a fluoride varnish applied at school or nursery. 188,709 toothbrushing home packs were distributed nationwide to encourage the development of effective preventative behaviours in the home setting.

**Skill mix**

Employing staff from a diverse range of backgrounds and a plethora of previous working experiences, the D2S programme is an exemplar of skill mix in action. Table 2 shows the job role variety and distribution amongst D2S staff.

Within dentistry, recent times have witnessed an increased focus on the development and utilisation of the extended skills of the whole dental team and on the concept of ‘skill mix’ to ensure the provision of services that are responsive to need, equitable and cost-effective. In contrast to the traditional view of the dentist as the main caregiver with a focus on intervention, ‘skill-mix’ describes a model of effective care, particularly prevention, being provided by other members of the dental team.

Led and implemented by a diverse range of staff, including but not exclusively dental care professionals (DCPs) and with a focus on partnership working with teaching/childcare staff and health professionals (eg health visitors), D2S exemplifies the success that can be achieved through effective implementation of ‘skill-mix’ strategies, going beyond the traditional dental team.

**Flexible working model**

The D2S programme operates a flexible working model, aiming to accommodate the individual needs of staff and advocate a healthy work-life balance.

### Table 1 D2S Programme Model

| Environment          | Who involved                      | Actions                                                  |
|----------------------|-----------------------------------|----------------------------------------------------------|
| Home                 | D2S teams                         | Staff and student training                               |
|                      | Health Visiting Services          | Healthy Child Wales                                      |
|                      | Early Years Service               | Programme oral health components                         |
|                      |                                   | Printed resources                                         |
|                      |                                   | Home packs/training cups                                 |
| Referral Pathway     |                                   |                                                          |
| Dental Practice      | DS2 teams                         | Staff training                                           |
|                      | Clinical Dental Services          | Evidence-based prevention and interventions             |
|                      |                                   | Resources                                                |
| Nursery and infant schools | D2S teams                      | Staff training                                           |
|                      | Teaching/Childcare staff          | Supervised toothbrushing programme                      |
|                      |                                   | Fluoride varnish programme                               |
|                      |                                   | Home Packs                                              |
|                      |                                   | Class teaching resources                                 |

### Table 2 Job role variety and distribution in the D2S programme

| Role                                      | % of D2S staff |
|-------------------------------------------|----------------|
| Administrator/ Driver                     | 7.2            |
| Dental Health Support Worker              | 31.6           |
| Oral Health Educator/Promoter (Dental Nurse) | 46.7           |
| Dental therapist/hygienist                | 2.8            |
| D2S Lead                                  | 12.0           |
| Senior Dental Officer                     | 0.6            |

WALES 100
Reducing paper use during administrative

Changing the design concept for toothbrush

Promoting a recycling scheme for

Encouraging staff to consider their own

Wales could be considered a relatively minor
emissions produced by NHS activity in
2016/2017 which, at 0.05% of the total carbon
were attributable to the D2S programme in
2009 and was noted as constituting the ‘first significant and
sustained improvement in the levels of dental
caries experienced by children in Wales since
records began.’

In 2007/08, 14 out of a class of 30 children
would have decay experience, and these 14 children
would have an average of 4.2 teeth affected. By 2015/16 this had fallen to ten
children out of a class of 30, and these 10
would have an average of 3.6 decayed teeth.

The oral health of children in Wales improved
across all social groups, with the most
deprived WIMD quintile seeing the largest
reduction in decay prevalence (by 15%) and
mean dmft score (by 0.6).

The most recent survey of 12-year olds in
Wales reported a 15% reduction in prevalence
doctoral decay from 45% in 2005/06 to 30% in
2016/17.

Impact of the D2S programme

The most recent survey of five-year olds in
Wales reported a reduction in the proportion
of children with decay between 2007/08
(47.6%) and 2015/16 (34.2%). Although not
possible to determine causality, this reduction
in disease level coincided with the inception
of the D2S programme in 2009 and was
noted as constituting the ‘first significant and
sustained improvement in the levels of dental
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In a recent survey of D2S staff, respondents
were asked to identify their individual
employment contract arrangements (Fig. 1). The survey revealed that 50% of D2S staff fall
between the ages of 25 and 44 years old, an
age group in which there is likely to be high
prevalence of employees with responsibility for
young children.

With a large majority of staff working part-
time hours and almost half working during
term-time only; it is likely that the flexibility
offered by the D2S programme is an attractive
option to individuals with personal and family
commitments, who wish to achieve a satisfactory
balance between work and home life.

Environmental sustainability

The D2S programme promotes the concept of
sustainable dentistry through its focus on the
prevention of disease, subsequently reducing
the need for restorative, extraction and sedation
treatments with a higher carbon footprint.

The delivery of the programme in community,
nursery and school-based settings also reduces
the carbon footprint associated with individual
patient travel arrangements to dental surgery
settings for equivalent procedures.

In line with legislation requiring organisations
both to calculate and understand their overall
carbon footprints and in response to concerns
regarding plastic waste resulting from the
programme, an environmental impact
assessment of D2S was recently carried out by
Public Health Wales.

This estimated that approximately 388
 tonnes of carbon dioxide equivalents (CO2e)
were attributable to the D2S programme in
2016/2017 which, at 0.05% of the total carbon
emissions produced by NHS activity in
Wales could be considered a relatively minor
contribution. However, acknowledging the
need for continuous improvement, a number of initiatives have already been undertaken, including:

- Changing the design concept for toothbrush
  storage in the classroom from the original
  ‘brush bus’ to a lighter ‘tooth train’ has
  reduced associated plastic by 70%
- Promoting a recycling scheme for
toothbrushes and toothpaste tubes with
Terracycle UK among the settings involved
in the programme, while providing
advice regarding mainstream recycling of
toothbrushes
- Encouraging staff to consider their own
  travel behaviours and to adopt more
  sustainable modes of travel where possible,
  while making recommendations at an
  organisational level, such as car sharing
  schemes and use of the D2S Mobile Dental
  Units where available
- Inclusion sustainability as an important
  consideration in future tendering processes
  for new materials and products.

Celebrating ten years!

The 2019/2020 academic year marks ten years
since the All-Wales introduction of the D2S
programme. To celebrate this milestone, an
Anniversary Week was held during September
2019. All participating nurseries, schools,
dental practices and early years health services
were encouraged to promote their involvement
with D2S. The launch of the Twitter accounts
(@D2S_Wales @CynllunGwen) enabled
nurseries and schools to share their own events
and festivities.

A national drawing competition to design
a birthday card for Dewi, the D2S mascot,
received an overwhelming response from
nurseries and schools, with subsequent visits
during term time from Dewi to deliver prizes to the winning
entrants across Wales (Fig. 2 and Fig. 3).

Schools and nurseries enrolled in the
D2S programme at its commencement and

The most recent survey of 12-year-olds
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in 2005/06 to 30% in 2016/17.
Dimensions: 595.3x841.9

be anticipated with certainty however, that significant challenges will have to be overcome.

Conclusions

The Well-being of Future Generations Act 2015 places responsibility on public bodies in Wales to work towards the achievement of seven ‘Well-being goals’ identified by the Act. These include: a prosperous Wales, a more resilient Wales, a more equal Wales, a healthier Wales, a Wales of cohesive communities, a Wales of vibrant culture and thriving Welsh language and a globally responsible Wales.

The D2S programme, through its emphasis on disease prevention, community-based healthcare, environmental sustainability and health equity makes very obvious strides towards the attainment of these goals.

Since the introduction of the programme a decade ago, significant improvements in the oral health of the most deprived children in Wales have been achieved, while the programme has been further refocused to ensure that it remains relevant and continues to direct intensive efforts and resources to the areas, families and children most in need, aligning with the principles of prudent healthcare.

The D2S programme also exemplifies the potential for successful utilisation of the extended skills of the whole dental team, along with others from non-clinical backgrounds in a flexible working model which advocates a healthy work-life balance.

Despite inevitable challenges to come, it is hoped that sustained efforts from the D2S programme in the next ten years will help to ensure that further reductions in the childhood levels of dental decay in Wales are realised, alongside associated reductions in the impact of dental pain, infection, poor nutrition, missed school days, general anaesthetics, dental anxiety and tooth loss on the next generation of Welsh children.

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