

Preventive and community dentistry

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Relevant pages in other chapters Plaque control ➡ Non-surgical treatment—plaque control, p. 198; prevention of secondary caries ➡ Principles of operative procedures, p. 234; prevention of trauma to anterior teeth ➡ Prevention, p. 95.

Principal sources and further reading British Society for Disability and Oral Health guidelines and policy documents 🌐 <http://www.bsdh.org.uk>. British Society of Paediatric Dentistry guidelines and policy documents 🌐 <http://www.bspd.co.uk>. DOH 2007 *Delivering Better Oral Health – An evidence-based toolkit for prevention* 🌐 <http://www.dh.gov.uk>. J. J. Murray 2003 *Prevention of Oral Disease* (4e), OUP. Scottish Intercollegiate Guideline Network (SIGN) guidelines 47 and 83 (preventing dental caries) 🌐 <http://www.sign.ac.uk>. R. R. Welbury et al. 2012 *Paediatric Dentistry* (4e), OUP. Scottish Dental Clinical Effectiveness Programme (SCDEP) 2010 *Prevention and Management of Dental Caries in Children* 🌐 <http://www.sdcep.org.uk>.

Dental caries

Dental caries (Fig. 2.1) is a sugar-dependent infectious disease.¹ Acid is produced as a by-product of the metabolism of dietary carbohydrate by plaque bacteria, which results in a drop in pH at the tooth surface. In response, calcium and phosphate ions diffuse out of enamel, resulting in demineralization. This process is reversed when the pH rises again. Caries is therefore a dynamic process characterized by episodic demineralization and remineralization occurring over time. If destruction predominates, disintegration of the mineral component will occur, leading to cavitation.

Enamel caries The initial lesion is visible as a white spot. This appearance is due to demineralization of the prisms in a sub-surface layer, with the surface enamel remaining more mineralized. With continued acid attack the surface changes from being smooth to rough, and may become stained. As the lesion progresses, pitting and eventually cavitation occur. The carious process favours repair, as remineralized enamel concentrates fluoride and has larger crystals, with a ↓ surface area. Fissure caries often starts as two white spot lesions on opposing walls, which coalesce.

Dentine caries comprises demineralization followed by bacterial invasion, but differs from enamel caries in the production of secondary dentine and the proximity of the pulp. Once bacteria reach the ADJ, lateral spread occurs, undermining the overlying enamel.

Rate of progression of caries Although it has been suggested that the mean time that lesions remain confined radiographically to the enamel is 3–4 years,² there is great individual variation and lesions may even regress.³ The rate of progression through dentine is unknown; however, it is likely to be faster than through enamel. Progression of fissure caries is usually rapid due to the morphology of the area. Rapid progression is especially common in primary molars, with progress from early dentine involvement to pulpal involvement in <1 year in some cases.

Arrested caries Under favourable conditions a lesion may become inactive and even regress. Clinically, arrested dentine caries has a hard or leathery consistency and is darker in colour than soft, yellow active decay. Arrested enamel caries can be stained dark-brown.

Susceptible sites The sites on a tooth which are particularly prone to decay are those where plaque accumulation can occur unhindered, e.g. approximal enamel surfaces, cervical margins, and pits and fissures. Host factors, e.g. the volume and composition of the saliva, can also affect susceptibility.

1 E. A. M. Kidd & S. Joyston-Bechal 1987 *Essentials of Dental Caries: The Disease and its Management*, Wright.

2 N. B. Pitts 1983 *Comm Dent Oral Epidemiol* 11 228.

3 A. Neilson & N. B. Pitts 1991 *Br Dent J* 171 313.

Saliva and caries Saliva acts as an intra-oral antacid, due to its alkali pH at high flow-rates and buffering capacity. Also:

- ↓ plaque accumulation and aids clearance of foodstuffs.
- Acts as a reservoir of calcium, phosphate, and fluoride ions, thereby favouring remineralization.
- Has an antibacterial action because of its IgA, lysozyme, lactoferritin, and lactoperoxidase content.

An appreciation of the importance of saliva can be gained by examining a patient with a dry mouth.

Chewing sugar-free gum regularly after meals does appear to ↓ caries, but the reduction is small.

Root caries With gingival recession root dentine is exposed to carious attack. Rx requires, first, control of the aetiological factors and for most patients this involves dietary advice and OHI. Topical fluoride may aid remineralization and prevent new lesions developing. However, active lesions will require restoration with GI cement (➡ Root surface caries, p. 240).

Caries prevention

Classically three main approaches are possible:

- Tooth strengthening or protection.
- Reduction in the availability of microbial substrate.
- Removal of plaque by physical or chemical means.

In practice this means dietary advice, fluoride, fissure sealing, and regular toothbrushing (which is also important in the prevention of periodontal disease). The relative value of these varies with the age of the individual.

Of equal importance with the prevention of new lesions is a preventive philosophy on the part of the dentist, so that early carious lesions are given the chance to arrest and a minimalistic approach is taken to the excision of caries where primary prevention has failed.

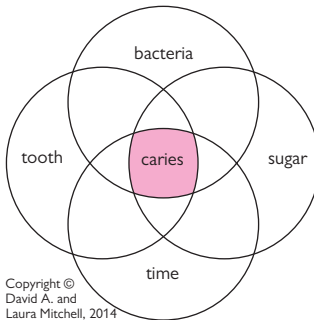


Fig. 2.1 The factors involved in the development of caries.

Caries diagnosis

As caries can be arrested or even reversed, early diagnosis is important.

Aids to diagnosis

- Good eyesight (and a clean, dry, well-illuminated tooth). Magnification between $\times 2$ and $\times 6$ (leaning forward with the naked eye magnifies the image but you can only get so close to your patient); loupes are better!
- A blunt probe should only be used to horizontally dredge plaque away from the fissures (as a sharp probe may actually damage an incipient lesion).
- B/w X-rays are useful in the detection of occlusal and approximal caries. They are best approached systematically viewing 'approximal–occlusal–approximal' surface for each tooth, first in enamel then dentine, first with the naked eye and then with a viewing box (magnification and external light blackened out or enlargement of digital images). The clinical situation is more advanced than the radiographic appearance. However, it is thought that the probability of cavitation is low when a lesion is confined to enamel on X-ray.
- Fiberoptic transillumination (FOTI) probes with a 0.5mm tip are useful for detecting dentinal lesions at approximal sites. FOTI is considered to be an adjunct to b/w X-rays.⁴
- Laser-based (e.g. DIAGNOdent®) and impedance-based (e.g. CarieScan PRO®) instruments are available which use properties of the carious lesion to produce a quantitative reading of infected carious tissue, particularly dentine caries. The value of such technologies in mainstream caries detection is as yet uncertain.

Diagnosis and its relevance to management

- ▶ Remember: precavitated lesion—prevention
cavitated lesion—prevention and restoration.
- ▶ Counsel the patient that if the lesion is not cavitated it has the potential to arrest. This makes the preventive advice very relevant to the patient, increasing the chance of that patient acting on the advice.

Smooth surface caries is relatively straightforward to diagnose. The chances of remineralization are \uparrow as it is obvious, and accessible for cleaning. Restoration is indicated if prevention has failed and the lesion is cavitated, or if the tooth is sensitive or aesthetics poor.

Pit and fissure caries is difficult to diagnose reliably, especially in the early stages. A sharp probe is of limited value as stickiness could be due to the morphology of the fissure. The anatomy of the area also tends to favour spread of the lesion, which often occurs rapidly. As fissure caries is less affected by fluoride and OH, f/s is preferable to watching and waiting. Occlusal caries evident on b/w X-rays should not always be excised. If the tooth is fissure-sealed or restored, check the margins very carefully, and if intact, monitoring the lesion radiographically is often justified initially. If marginal integrity not intact, investigate the area with a small round bur. The 'cavity' can be aborted if no caries found and the surface sealed.

4 Faculty of General Dental Practitioners 2013. *Selection Criteria for Dental Radiography*, RCS (Eng).

Approximal caries Currently accepted practice:

- If lesion confined to enamel on b/w X-rays, institute preventive measures and keep under review.
- If lesion has penetrated dentine radiographically, a restoration is indicated unless serial radiographs show that it is static.

If in doubt whether an approximal lesion has cavitated or not, fit an elastic orthodontic separator for 3–7 days so the surfaces can be visualized.

Recall intervals⁵

This subject has evoked considerable controversy, some arguing that regular attendance puts a patient more at risk of receiving replacement fillings, while others contend that regular and frequent check-ups are necessary to monitor prevention. In fact, it would appear that only a minority of the British public attend for 6-monthly check-ups. The available evidence suggests that there is no clear benefit for recall intervals of <1 year for *healthy* patients, although the at-risk patient often needs to be seen more frequently.⁶ In addition, as changing dentist ↑ the likelihood of replacement restorations the profession has to re-examine its criteria for replacement.

In the UK, guidance from the National Institute of Health and Care Excellence (NICE) recommends that dental recall intervals ('oral health review' intervals) should be determined by the needs of the individual patient based on a risk assessment of existing disease progressing or new disease developing. For adult patients this interval can be between 3 and 24 months and for children 3 and 12 months.⁵

A child's first check-up should occur once the first teeth have erupted (i.e. usually between 6 months and 1 year of age).

5 NICE 2004 *Clinical guideline on dental recall (CG19)* (® <http://www.nice.org.uk>).

6 N. B. Pitts & E. A. Kidd 1992 *Br Dent J* 172 225.

The history of fluoride is covered well in other texts.⁷

Enamel deposition
and calcification → Enamel maturation → Eruption into oral
environment

↑ ↑ ↑

Fluoride in blood Fluoride in tissue fluid Fluoride in saliva fluid
and cervicular fluid

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The concentration of fluoride in enamel ↑ with ↑ fluoride content of water supply and ↑ towards the surface of enamel.

- Improved crystallinity and ↑ crystal size, and ∴ ↓ acid solubility.
- More rounded cusps and fissure pattern, but the effect is small.

Discontinuation of systemic fluoride results in an ↑ in caries, ∴ pre-eruptive effects must be limited.

Post-eruptive effects NB Newly erupted teeth derive the most benefit.

- Inhibits demineralization and promotes remineralization of early caries. Also enhances the degree and speed of remineralization and renders the remineralized enamel more resistant to further attack.
- ↓ acid production in plaque by inhibiting glycolysis in cariogenic bacteria.
- An ↑ concentration of fluoride in plaque inhibits the synthesis of extracellular polysaccharide.
- It has been suggested that fluoride affects pellicle and plaque formation, but this is unsubstantiated.

At higher pH fluoride is bound to protein in plaque. A drop in pH results in release of free ionic fluoride, which augments these actions.

NB Fluoride is more effective in ↓ smooth surface than pit and fissure caries.

Safety and toxicity of fluoride

Fluoride is present in all natural waters to some extent. Many simple chemicals are toxic when consumed in excess, and the same is true of fluoride.

Fluoride is absorbed rapidly mainly from the stomach. Peak blood levels occur 1h later. It is excreted via the kidneys, but traces are found in breast milk and saliva. The placenta only allows a small amount of fluoride to cross, therefore pre-natal fluoride is relatively ineffective.

Fluorosis (or mottling) occurs due to a long-term excessive consumption of fluoride. It is endemic in areas with a high level of fluoride occurring naturally in the water (Table 2.1). Clinically, it can vary from faint white opacities to severe pitting and discoloration. Histologically, it is caused by ↑ porosity in the outer third of the enamel.

7 J. J. Murray 2003 *Prevention of Oral Disease* (4e), OUP.

Table 2.1 Degree of fluorosis

Concentration of fluoride (ppm) in water supply	Degree of mottling
<0.9	+
0.9	+
2	++
>2	++++

Toxicity

Safely tolerated dose (STD) Dose below which symptoms of toxicity are unlikely = 1mg/kg body weight.
Potentially lethal dose (PLD) Lowest dose associated with a fatality. Patient should be hospitalized = 5mg/kg body weight.
Certainly lethal dose (CLD) Survival unlikely = 32–64mg/kg body weight.

Fluoride concentration in various products

- Standard fluoride toothpastes:
 - 1000ppm F (parts per million fluoride) = 1mg F/mL.
 - 1500ppm F = 1.5mg F/mL.
- Daily fluoride mouthrinse 0.05% NaF=0.023% F=0.23mg F/mL.
- APF gel 1.23% F=12.3mg/mL.
- Fluoride varnish 5% NaF=2.26% F=22.6mg/mL.

To reach the 5mg F/kg threshold (requiring hospitalization) a 5yr-old (about 19kg) would have to ingest 95 (1mg F) tablets, 63mL of 1500ppm toothpaste, or 7.6mL of 1.23% of APF gel.

Antidotes <5mg F/kg body weight—large volume of milk. >5mg F/kg body weight—refer to hospital quickly for gastric lavage. If any delay give IV calcium gluconate and an emetic.

► For advice about managing fluoride overdose contact National Poisons Information Service (0844 8920111).

Health benefits vs risks of fluoride. A number of detailed systematic reviews have been conducted to investigate the efficacy and safety of fluoride, especially in the context of public water fluoridation schemes.^{8,9,10} These have all essentially come to the same conclusions:

- Water fluoridation is beneficial in reducing dental caries.
- Whilst a link with cancer (specifically osteosarcoma) has been suggested by some authors, all major systematic reviews have concluded that no conclusive evidence of such a link exists.
- ↑ the level of fluoride in water supplies to optimal levels is accompanied by an ↑ prevalence of dental fluorosis, mostly mild and not considered to be of aesthetic concern.
- Most systematic reviews have concluded that fluoridation has little or no effect on the prevalence of bony fractures.

8 E. G. Knox 1985 *Fluoridation of water and cancer: a review of the epidemiological evidence*. HMSO.
9 M. McDonagh et al. 2000 *A systematic review of public water fluoridation*, University of York NHS Centre for Reviews and Dissemination.
10 Australian National Health and Medical Research Council 2007. Australian Government.

Planning fluoride therapy

Most important action of fluoride is to favour remineralization of the early carious lesion. Although fluoride incorporated within developing enamel results in a high local concentration following acid attack, the maximum benefit appears to be derived from frequent low-concentration topical administration.¹¹

Systemic fluoride

► To minimize the risk of mottling only one systemic measure should be used at a time.

Water fluoridation at 1ppm (1mg F per litre) reduces caries by 50%. Main advantages are systemic and topical effect; no effort is required on the part of the individual; and the low cost. Yet despite this only 10% of the UK population has fluoridated water. In some countries school water has been fluoridated, but a concentration of 5ppm is required to offset the less frequent intake.

Fluoride drops and tablets Regimen (mg F per day) depends upon drinking water content (see Table 2.2). This approach can be almost as effective as fluoridated water, but this requires good parental motivation. Unfortunately, compliance is generally poor, so benefit as a public health measure questionable.

Milk with 2.5–7ppm F has been tried successfully.

Salt is cheap and effective for rural communities in developing countries where water fluoridation is not feasible.

Topical fluoride

Professionally applied fluorides Overall, caries ↓ of 20–40%. Gels or foams applied in trays are still popular in some parts of the world, but without adequate suction the systemic dosage can be high and patients may not tolerate these well. Hence, their use in the UK is not extensive. Fluoride varnish (e.g. Duraphat® 5% NaF) is useful for applying directly to individual lesions to aid arrest. Fluoride varnish has been shown to be effective at ↓ caries incidence in children, and regular application (2 times per year ↑ to 3–4 times per year where caries risk is ↑) is now advocated for all children over age 3 years deemed to be at risk of caries.¹ However, it should be applied carefully and sparingly, especially in young children as it contains 23 000ppm fluoride.

Rinsing solutions C/I in children <7yrs. The concentration depends upon the frequency of use: 0.2% fortnightly/weekly or 0.05% daily. Daily use is the most beneficial. Caries reductions of 16–50% have been reported with rinsing alone. The most widely used solution is sodium fluoride.

Toothpastes aid tooth cleaning, but, most importantly, provide fluoride. In the UK they contain abrasives (to a specified abrasivity standard), detergents, humectants, flavouring, binding agents, preservatives, and active agents, including:

- Fluoride. Most toothpastes contain sodium monofluoro-phosphate &/or NaF, in concentrations of 1000–1500ppm (i.e. 1–1.5mg per 1cm of paste). Caries reductions of 15% (in fluoridated areas) to 30% (in non-fluoridated

11 DOH 2007 *Delivering Better Oral Health—An evidence-based toolkit for prevention* (® <http://www.dh.gov.uk>).

areas) are reported. Low-dose formulations for children <7yrs containing <500ppm are available, to ↓ risk of mottling, but such low concentrations are unlikely to be effective at significantly reducing caries.

- Anticalculus agents, e.g. sodium pyrophosphate, can ↓ calculus formation by 50%.
- De-sensitizing agents, e.g. 10% strontium or potassium chloride, or 1.4% formaldehyde.
- Antibacterial agents, e.g. triclosan.

Recommended daily fluoride supplementation (mg F)^{12,13,14}

For children considered to be at high risk of caries and who live in areas with water supplies containing <0.3ppm see Table 2.2.

Table 2.2 Daily fluoride supplementation

Age	mg F per day
6 months to 3yrs	0.25
3yrs to 6yrs	0.5
>6yrs	1.0

Toothpaste¹

- Brush bd with a >1000ppm fluoride toothpaste. >3yrs and those at ↑ risk of developing caries use 1350–1500ppm fluoride toothpaste.
- Children <3yrs of age should use a 'smear' and >3yrs a small pea-size blob (<0.3mL) of toothpaste.
- Spit out well, but do not rinse, after brushing.
- Brushing with fluoride toothpaste should start as soon as the first teeth erupt (about 6 months of age). Parents should supervise brushing up to at least 7yrs of age to avoid over-ingestion of toothpaste and ensure adequate plaque removal.

Fluoride supplement (drops and tablets)

May be prescribed for children deemed to be at risk of developing caries living in areas with less than optimal fluoride in the water supply. Compliance with self-administered fluoride supplements is often poor (i.e. parents often forget to administer them regularly).

Fluoridation of water still remains the most cost-effective method.

Other products

Casein phosphopeptide/amorphous calcium phosphate—based on concentrated milk proteins shows promise for both caries prevention and enamel remineralization.

Chlorhexidine varnish has also shown some efficacy in preventing approximal caries.

12 DOH 2007 *Delivering better oral health: An evidence-based toolkit for prevention* (<http://www.dh.gov.uk>).

13 BDA/BSPD/BASCD 1997 *Br Dent J* 182 6.

14 R. Holt et al. *Int J Paed Dent* 1996 6 139.

Bacterial plaque and dental decay

Evidence for role of bacteria in dental caries

- *In vitro*. Incubating teeth with plaque and sugar in saliva results in caries.
- Animal experiments, e.g. germ-free rodents fed a cariogenic diet do not develop caries, but following the introduction of *Streptococcus mutans* caries occurs.
- Epidemiological evidence showing that a supply of bacterial substrate results in caries.
- Clinical experiments, e.g. stringent removal of plaque ↓ decay.

A correlation has been found between the presence of *Strep. mutans* and caries. This is not surprising, because this organism is acidophilic, can synthesize acid rapidly from sugar, and produces a sticky extracellular polysaccharide which helps bind it to the tooth. However, caries can develop in the absence of *Strep. mutans*, and its presence does not inevitably lead to decay, e.g. root caries has been associated with *Strep. salivarius* and *Actinomyces* species. *Lactobacillus* species are also acidophilic and have been implicated in fissure caries. In addition, plaque prevents acid diffusing away from the enamel and hinders the neutralizing effect of salivary buffers.

Methods of preventing caries by bacterial control

Physical removal of plaque

- By a professional. If sufficiently frequent it can ↓ caries,¹⁵ but is impractical as a population-based approach.
- By the individual. The available evidence suggests that toothbrushing alone is not an effective method of caries control. However, a recent long-term study has demonstrated much less oral disease, including dental caries, in patients who maintain good plaque control over many years.¹⁶ Also ↓ gingivitis.

Chemical removal of plaque To achieve more than a transitory effect, an antiseptic needs to be retained in the mouth. Chlorhexidine, a positively charged bactericidal and fungicidal antiseptic, is capable of this. It is attracted to the negatively charged proteins on the surface of teeth and oral mucosa and in saliva from where it gradually leaches out. It is available as a 0.2% mouthwash and a 1% gel which are cheaper over the counter than by prescription. Although the main application of chlorhexidine is in the management of gingivitis, it has been shown to be effective at ↓ caries when used regularly.¹⁷ While its widespread use for this purpose is not practical, it can be helpful in the management of disabled patients or those with ↓ salivary flow. Unwanted effects include staining, disturbance of taste, and parotid swelling (which is reversible). It is less effective in the presence of a large build-up of plaque and is inactivated by commercial toothpastes.

15 J. Lindhe et al. 1975 *Comm Dent Oral Epidemiol* 3 150.

16 J. M. Broadbent et al. 2011 *JADA* 142 415.

17 H. Loe et al. 1972 *Scand J Dent Res* 80 1.

A variety of pre-brushing rinses are now available. Research suggests that these do have a small beneficial effect if used in conjunction with toothbrushing.¹⁸

Immunization against caries As no vaccine is completely safe, the ethics of vaccinating against caries, an avoidable non-lethal disease, have been hotly debated.¹⁹ Yet, despite considerable research, efforts to produce a viable vaccine have been unsuccessful due to a number of problems:

- Which species of *Strep. mutans* to target, and whether pathogenicity would then shift to another species.
- Differing modes of action in monkeys and rodents, therefore ? relevance of experiments to humans.
- Cross-reactivity with heart muscle in animal experiments.
- Duration of effect and acceptance by public. Some patients may prefer caries to repeated injections of a vaccine.

Notebox:

**Summary points for caries
(you write here)**

¹⁸ H. V. Worthington et al. 1993 *Br Dent J* 175 322.

¹⁹ W. Sims 1985 *Comm Dent Health* 2 129.

Fissure sealants

Pits and fissures provide a sheltered niche for bacterial proliferation. Toothbrush bristles are too wide to fit into these areas, making complete plaque removal impossible. A fissure sealant (f/s) is a material that provides an impervious barrier to the fissure system to prevent the development of caries.

Historical Several approaches to ↓ fissure caries have been tried:

- Chemical Rx of the enamel, e.g. with silver nitrate.
- Prophylactic odontotomy. This involved restoring the fissure with amalgam (hardly a preventive approach!).
- Sealing of the fissures. Several materials have been tried, including black copper cement (not retained), cyanoacrylate (toxic), polyurethane, and GI cement. The most common type of f/s is a composite resin used with an acid-etch technique.

Is there a need for sealants? In developed countries ↓ in caries seen in recent years has not been uniform for all tooth surfaces. Part of this ↓ is due to an ↑ availability of fluoride, leading to a greater reduction in approximal, rather than in pit and fissure caries. Therefore the need for a method of occlusal caries is even more pressing.

Are sealants effective? To be effective, need to be carefully applied to susceptible teeth. Most valuable in recently erupted (especially first) molars, but moisture control may be difficult. Therefore sealants should be monitored and replaced if lost. For maximum benefit, teeth should be sealed as soon as practicable after eruption and certainly within 2yrs. Guidelines for placement of f/s have been described.^{20,21}

Patient selection f/s should be provided for 6s in:

- children with impairments.
- those with extensive caries in the primary dentition (dmfs is 2 or more).

Children with caries-free primary dentitions do not need routine f/s of 6s but should be monitored regularly. f/s of primary molars is not normally recommended.

Tooth selection

For children who fulfil the earlier given criteria:

- All susceptible fissures of permanent teeth should be sealed—occlusal, fissures and cingulum, buccal, and palatal pits. Teeth should be sealed as soon as sufficiently erupted for adequate moisture control.
- Where occlusal caries affects one 6 the remaining caries-free permanent molars (6s and 7s) should be f/s.

If there is doubt about a stained fissure, a b/w X-ray should be taken. If the lesion is in enamel, f/s and monitor clinically and radiographically. If in doubt, carry out an enamel biopsy. If the lesion extends to dentine place a PRR, providing the cavity does not extend to more than one-third of the occlusal surface, in which case a conventional restoration is required. Composite resin-based sealant retention: >85% after 1yr and >50% after 5yrs.²²

20 BSPD 2000 *Int J Paed Dent* 10 174.

21 C. Deery 2013 *Brit Dent J* 214 551.

22 National Institutes of Health 1984 *J Am Dent Assoc* 108 233.

Discussion of the cost-effectiveness of sealants compared to restoration has been well aired over the years, which is surprising given that the end results are not comparable. Fissure sealants are highly effective, and reduce the incidence of dentine caries over 4 years by >50%.

Types of fissure sealant Sealants can be classified by polymerization method (light- or self-cure), resin system (Bis-GMA or urethane diacrylate), colour (clear or tinted), and whether they are filled or unfilled. The choice is one of personal preference; however, it has been pointed out that coloured/opaque sealants are more readily obvious to the patient. The retention rates of the different types are similar: success depends upon maintaining an absolutely dry field during application.

GI sealants do release fluoride but have poorer retention than resin sealants. They are useful for high caries-risk children as a temporary sealant where adequate isolation for successful placement of resin-based sealants is not possible, e.g. partially erupted teeth/poor cooperation.

Resin fissure sealant technique

- Prophylaxis (this may be omitted if the tooth is already relatively free from plaque).
- Isolate and dry the tooth.
- Etch for the time recommended by the manufacturer (usually 20–40sec) with 30–50% phosphoric acid.
- Wash thoroughly, re-isolate, and dry very, very well. If salivary contamination occurs or parts of the surface have not etched well, re-etch.
- Application of a suitable enamel bonding agent may improve retention.
- Apply f/s (method depends upon delivery system).
- After polymerization try to remove the sealant. If satisfactory, occlusal adjustment is usually not required unless a large volume has inadvertently been applied or a filled resin is used.

Follow up f/s should be monitored clinically and where appropriate, radiographically (b/w). Defective sealants should be replenished to maintain their marginal integrity.

Sugar

Sugar—is used to refer to the mono- and disaccharide members of the carbohydrate family. Monosaccharides include glucose (dextrose or corn sugar), fructose (fruit sugar), galactose, and mannose. Disaccharides include lactose (in milk), maltose, and sucrose (cane or beet sugar). Polysaccharides (starch) are chains of glucose molecules and are not readily broken down by the oral flora. Dietary sugars have been classified as intrinsic when they are part of the cells in a food (vegetables and fruit) or extrinsic (milk sugar or, the real baddy, non-milk extrinsic sugar, e.g. table sugar). Both intrinsic and extrinsic sugars may cause decay, although non-milk extrinsic sugars are most cariogenic.

Evidence for the role of sugar in dental caries²³

- Epidemiological evidence:
 - Worldwide comparison of sugar consumption and caries levels.
 - Low caries experience of people on low-sugar diet, e.g. wartime diet; patients with hereditary fructose intolerance.
 - ↑ caries experience following ↑ availability of sugar, e.g. Inuits.
 - Cross-sectional studies relating caries experience to sugar intake.
- Clinical studies, e.g. Vipeholm study, Turku sugar study (xylitol).
- Plaque pH studies, *in vivo* and *in vitro*. See Stephan curve, Fig. 2.3.
- Animal experiments, e.g. rats fed by stomach tube do not develop caries.

Sucrose is considered a major culprit—most commonly available sugar and able to facilitate production of extracellular polysaccharide in plaque. However, other sugars can also cause caries. E.g. frequent consumption of fruit-based drinks is known to be a key factor in the development of early childhood caries (ECC). In ↓ cariogenicity:

- Sucrose, glucose, fructose, maltose.
- Galactose, lactose.
- Complex carbohydrate (e.g. starch in rice, bread, potatoes).

The frequency of sugary intakes and the interval between them, the total amount of sugar eaten in the diet, and the concentration of sugar and stickiness of a food have been shown to be important. The acidogenicity of a sugar-containing food can be modified by other items in the food or meal. Foods that stimulate salivary flow can speed the return of plaque pH to normal, e.g. cheese, sugar-free gum, salted peanuts.

Sugar and health In 1989 the COMA panel on Dietary Sugars and Human Disease reported that dental decay is positively associated with the frequency and amount of non-milk extrinsic sugar consumption. However, while sugar may contribute to the excess calorific intake which causes obesity and predisposes towards diabetes or coronary heart disease, there is no direct evidence linking sugar intake and these medical conditions.²⁴

23 A. J. Rugg-Gunn 1993 *Nutrition and Dental Health*, OUP.

24 COMA 1989 *Dietary Sugars and Human Disease*, HMSO.

Prevention of caries by ↓ the availability of microbial substrate in food

This approach aims to take into account the modern habit of 'snacking' (also known as 'grazing'):

- Remove sugar from selected foods.
- Substitute non-cariogenic sweeteners.
- Modify sugar-containing foods so that they are less cariogenic.

Modification of only a restricted number of snack foods would probably be insufficient to have a significant effect.

Fig. 2.3 is a Stephan curve showing the pH drop that occurs after a sugary drink is consumed (shown by arrow). The dashed line indicates the critical pH; below this pH demineralization will occur. The shape of the curve is affected by a number of factors, including the type of sugary food, buffering potential of the saliva, and foods or drinks ingested after the sugary challenge.

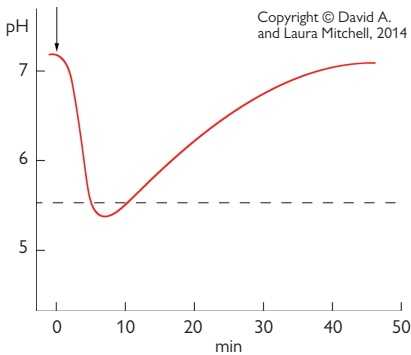


Fig. 2.3 pH drop after consumption of sugary drink.

Alternative sweeteners

(In Table 2.3 sweetness of sucrose = 1.)

Table 2.3 Comparison of sweeteners				
Sweetener	Type	Sweetness	Cariogenicity	Comments
Sorbitol	Bulk sweetener	0.5	Low	Isocaloric to sugar
Mannitol	Bulk sweetener	0.7	Low	
Xylitol	Bulk sweetener	1	None	Diarrhoea
Isomalt	Bulk sweetener	0.5	Low	
Lycasin ^a	Bulk sweetener	0.75	Low	
Acesulfame	Intense	130	None	
Aspartame	Intense	200	None	C/I in phenylketonuria
Stevia	Intense	300	Thought to be low ^b	Recently approved in EU and USA
Saccharin	Intense	500	None	Bitter aftertaste
Thaumatococin	Intense	4000	None	

^a Lycasin[®] is the trade name for hydrogenated glucose syrup (which didn't fit in the table!).^b Currently limited evidence from animal trials.

The bulk sweeteners (largely polyols) can cause osmotic diarrhoea if consumed in large amounts and are therefore C/I in small children. However, it is probably wise to avoid all artificial sweeteners in pre-school children. The bulk sweeteners are isocaloric with sucrose, whereas the intense sweeteners are low calorie.

Recommendations for ↓ the risk of caries

- Reduce frequency of consumption of sugar-containing foods and drinks, especially between meals.
- Reduce frequency of consumption of fruit-based drinks, even those labelled 'no added sugar'.
- A few snack foods are 'safe' (e.g. nuts and cheese), but foods containing artificial sweeteners may be less decay-producing.
- Foods containing starch and sugar in combination (e.g. cakes, biscuits) and carbonated sugary drinks are especially decay-producing.

Notebox:
Summary points for caries prevention
(you write here)

Dietary analysis and advice

Diet can affect teeth:

- *Pre-eruptively*—fluoride is the most important. The effect of calcium, phosphate, vitamins, and sugar is unclear, but is unlikely to be great.
- *Post-eruptively*—again, fluoride is important, as is sugar. Acidic foods or drinks can cause erosion (☹️ Tooth wear/tooth surface loss, p. 244).

Dietary analysis

Aim To ↓ the time for which the teeth are at risk of demineralization and increase the potential remineralization period.

Indications (i) high caries activity, (ii) unusual caries pattern, (iii) suspected dietary erosion.

Dietary advice should be tailored to the individual. This is most easily done after analysing the patient's present eating pattern.

Method A consecutive 3- or 4-day analysis (including at least one weekend day) is the most widely used, with the patient recording the time, content, and quantity of food/drink consumed. In addition, toothbrushing and bed-time should be indicated. When the form is returned the entries should be checked with the patient.

Analysis

- Ring the main meals. If in any doubt, identify those snacks that contain complex carbohydrate. Assess nutritional value of meals.
- Underline all sugar intakes in red.
- Identify between-meal snacks and note any associations, e.g. following insubstantial meals or at school.
- Decide on a maximum of three recommendations.

Dietary advice should include an explanation of the effect of between-meals eating and sugary drinks. It must also be personal, practical, and positive! The suggestion that a child should select crisps when friends are buying sweets is more likely to be followed than total abstinence.

Some helpful hints:

- Save sweets to be eaten on 1 day, e.g. Saturday dinnertime, or to be eaten at the end of a meal.
- All-in-one chocolate bars are preferable to packets of individual sweets.
- Foods which ↑ salivary flow (e.g. cheese, sugar-free chewing gum) can help to reverse the pH drop due to sugar if eaten afterwards.
- Treacle, honey, and fruit (especially fruit juice) are cariogenic.
- Artificial sweeteners should be avoided in pre-school children.
- Fibrous foods, e.g. apples, are preferable to a sucrose snack, but they can still cause decay and there is no evidence that they can clean teeth.

Where the nutritional content of meals is inadequate, considerable tact is necessary. It may be possible to suggest that larger meals would reduce the temptation to eat snacks. For children who are 'picky' eaters snacks and sweets saved until the end of a meal can act as an encouragement to consume more food at mealtimes.

BUT remember that while cheese, peanuts, and crisps may constitute a safe snack in dental terms, they are all high in fat, and peanuts can be inhaled by small children. Also, 'diet' cola drinks are sugar-free, but can still cause erosion if large quantities are drunk.

Therefore, dental dietary advice should be given in the wider context of the general health of the individual, i.e. ↓ consumption of sugars and fats, and ↑ consumption of fibre-rich starchy foods, fresh fruit, and vegetables. Meals provide a better nutritional balance than snacks. Hence good eating/drinking at mealtimes and avoiding between meals snacking is healthy.

Dental health education

What is it? The objective of dental health education is to influence the attitude and behaviour of the individual to maintain oral health for life and prevent oral disease.

- *Primary prevention*—seeks to prevent the initial occurrence of a disease or disorder and is aimed at healthy individuals.
- *Secondary prevention*—aims to arrest disease through early detection and Rx.
- *Tertiary prevention*—helps individuals to deal with the effects of the disease and to prevent further recurrence.

Who should give it? All health professionals. In practice, many patients relate better to advice from a hygienist or nurse.

What information should be given? It is important that the information given is factual and that different sources do not give conflicting advice. In order to unify the profession's approach, the Health Education Authority has published a policy document²⁵ laying out four simple messages:

- Restrict sugar-containing foods to mealtimes.
- Clean teeth and gums thoroughly twice daily with a fluoride toothpaste.
- Attend the dentist regularly.
- Water fluoridation is beneficial.

How? The way in which the advice is imparted is as important as its content. There are three main routes:

- The mass media. This is an expensive alternative and, whilst commercial advertisers tempt the consumer, the success of a dental health education message which is exhorting the public to stop doing something they find pleasurable is not guaranteed.
- Community programmes. These need to be carefully planned, targeted, and monitored.
- One-to-one in the clinical environment. This is usually the most successful approach, because the message can be tailored to the individual and reinforcement is facilitated. However, it is expensive in terms of manpower.

Individual dental health education Because many patients find the dental surgery threatening, it may be better to choose a more neutral environment, e.g. a dental health or preventive unit. It is important that the information is given by someone the patient trusts and can relate to—this is not always the dentist! It is important also to have adequate time, as a hurried approach is of dubious value, and to choose words that the patient will understand.


25 Health Development Agency 2004 *The Scientific Basis of Dental Health Education* (4e) (<http://www.nhsbsa.nhs.uk>).

The following approach has been used successfully:

- Define the problem and its aetiology. For example, poor OH which has resulted in periodontal disease—is it because the patient lacks motivation or the appropriate skills? This stage includes questioning the patient to discover how often and for how long he brushes.
- Set realistic objectives. It is better to start with trying to motivate the patient to brush well once a day rather than teaching them how to floss.
- Demonstrate on the patient, as this makes the advice more relevant, and more likely to be remembered.
- Monitor by comparing plaque scores before and after. This not only enables you to monitor improvement but also allows improvements in the patient's oral hygiene behaviour to be reinforced.
- Remember that everyone responds well to praise, so if a patient is doing well, tell him.

Keys to successful dental health education

- Relevant to the individual, their lifestyle and problems.
- Keep the message simple. Too much information may be counter-productive.
- Repetition of message.
- Positive reinforcement.

Where to go for help or information Advice on preparing a talk on dental health education, setting up a preventive unit, or even a health programme can be obtained from Health Education England and more specifically your Local Education and Training Board ( <http://www.hee.nhs.uk>).

Notebox:

**Summary points for dental health education
(you write here)**

Provision of dental care

Delivery of care

General Dental Service This is the main source of dental care for the majority of the population (whether NHS or private).

Salaried Dental (Community) Service The Community Dental Service (CDS) was formed from the School Dental Service in 1974.

In 1989 the remit of the CDS was expanded (the guidance being updated in 1997) to cover the following:

- Provision of oral health promotion.
- Rx for patients for whom there is evidence they would not otherwise seek Rx from the GDS, e.g. patients with special needs.
- Rx of patients who have experienced difficulty obtaining Rx from the GDS (normally termed the 'safety net' function).
- Provision of Rx which may not be generally available in the GDS.
- Dental health screening of children in state schools and other vulnerable groups with particular special needs. (This activity has been reduced in recent years.)
- Epidemiology to assist the planning of local health services and as part of coordinated national surveys.

Community Dental Services, Salaried General Dental Services, and/or Emergency Dental Services have undergone significant changes in recent years. In many areas of the UK, they have been managerially amalgamated and are now known as *Salaried Primary Dental Care Services*. The range of services provided and patients accepted by such services can vary between localities and many no longer offer 'safety-net' services with more emphasis on care delivery to patients with disability, co-morbidity, and the elderly.

Hospital Service The role of the consultant service is to provide specialist advice and Rx, in addition to postgraduate training.

Receipt of care

Two factors are important:

- Availability and accessibility of dental services. Research shows that a greater proportion of the public visit the dentist regularly where the dentist to population ratio is high. This ratio tends to follow a geographical pattern, with the greatest number of dentists in the south-east.
- Social class affects both the incidence of dental disease and the uptake of dental care. Interestingly, the differences in caries experience between the social classes are much lower in fluoridated regions.

Because dentists have traditionally preferred to practise in leafy suburbs rather than poor inner city areas, these effects are often compounded.

Barriers to the uptake of dental care²⁶

Aside from the problems experienced by patients accessing NHS dental care, research has shown that the two main barriers to regular uptake of dental care by the general public are anxiety and cost.

Anxiety This manifests as fear of pain or a particular procedure, or a feeling of vulnerability brought about by relinquishing control to the dentist in the sensitive area of the mouth. A patient's first impressions are important as the reception they receive from staff and the environment in which they wait to be seen could either allay or reinforce their anxieties. The attitude of the dentist is also a significant factor: a 'good' dentist has a friendly, personal touch and explains what treatment is going to involve.

Cost The perception still exists that dental Rx is expensive. Patients often find the way in which the charges are calculated confusing, but welcome an estimate of the costs prior to Rx.

Furthermore the pattern of attendance varies throughout life, with children now enjoying a visit to the dentist, but adolescents breaking the habit of regular attendance due to apathy &/or other pressures on their time. A return to the dentist may be triggered by pregnancy and desire to provide a good example to the children, or a need for urgent Rx and a fear of becoming edentulous.

26 K. B. Hill et al. 2003 *Br Dent J* 195 654.

Dentistry for the disabled

A disabled person is someone with a physical or mental impairment which has a substantial and long-term adverse effect on his ability to carry out normal day-to-day activities.

Intellectual impairment (mental disability/learning difficulty) Prevalence 3%. Classified into mild (IQ 50–70) and severe (IQ <50).

Many cases lack well-defined aetiology but there are some subgroups where cause/diagnosis is known:

- Down syndrome; Fragile-X syndrome.
- Cerebral palsy, birth anoxia.
- Meningitis, rubella.
- Autism, microcephaly.

Physical impairment Most common is cerebral palsy, which is the motor manifestation of cerebral damage. Many patients with cerebral palsy have normal IQs, but ↑ muscle tone and hyperactive reflexes can make Rx difficult. Many can be treated in general dental practice provided there is wheelchair access.

Medical impairment 1% of children have either heart disease, bleeding disorders, diabetes, or kidney disease.

Sensory impairment i.e. blindness, deafness (Fig. 2.4).

Many have more than one type of impairment.


The described groups are general disabilities. We also need to consider those that are orally disabled, i.e. have gross oral problem or deficit which necessitates special dental Rx (e.g. cleft lip &/or palate).

Disability Discrimination Act 1995—this requires that:

- Employers must not discriminate against disabled employees.
- Service providers (including dentists) have to consider making reasonable adjustments to the way they deliver services so that disabled people can access them.

Problems

It is difficult to generalize, but usually mental disability provides the biggest challenge. Difficulties ↑ in patients with >1 impairment.

- Delivery of care. This has three aspects: (i) ↓ demand, due to low priority placed on dental health; (ii) lack of provision made to provide the necessary care; (iii) practical difficulties in carrying out dental work.
- In general, disabled patients have ↓ plaque control and ↑ periodontal problems.
- Although caries incidence is not significantly ↑ compared to the normal population, the amount of untreated caries often is.
- Long-term sugared medications.
- Prevalence of hepatitis in institutionalized patients.
- Dentures may be impractical therefore extractions not a realistic solution to the problems of providing dental Rx.
- Consent (see  Consent, p. 674).

**The Royal National Institute for the Deaf
STANDARD MANUAL ALPHABET**

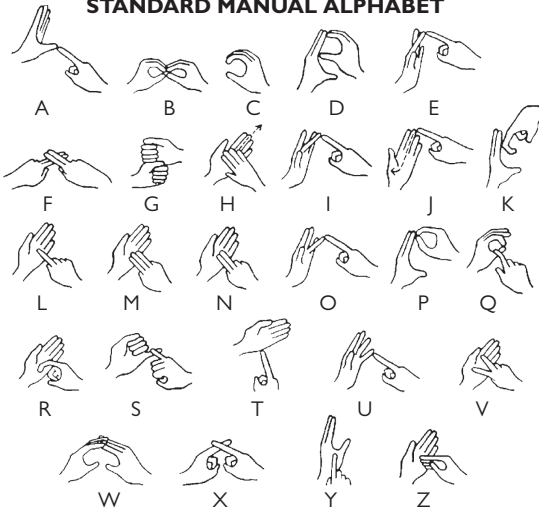


Fig. 2.4 The Standard Manual Alphabet. Reprinted by kind permission of Action on Hearing Loss (<http://www.actiononhearingloss.org.uk>).

Management

Difficult to generalize. Patients with less severe disabilities can be treated in dental practice. Those with severe medical &/or mental impairments are probably best managed by a specialist who will have ↑ access to specialist facilities.

Rx planning An initial plan should be formulated ignoring the disability. This can then be discussed with the patient, parent, or carer and modified for the individual. Where treatment needs are not urgent, it is advisable to start with OHI and prevention, then re-assess Rx requirements in the light of the response. For those patients for whom a satisfactory standard of OH is not possible, restorative Rx should aim to ↓ plaque accumulation. Excellent guidelines for the dental care of patients with disability and impairment have been produced by the British Society for Disability and Oral Health.²⁷

OHI Those patients who can brush their own teeth should be encouraged to do so. Modification of toothbrush handles (➡ General management problems, p. 322) or purchase of an electric one may be helpful. Where patients are unable to brush their teeth, instruction should be given to their carer. The best method is to stand behind the patient and cradle the head with one arm, leaving the other free to brush. However, if possible this should be supplemented with regular professional cleaning. Chemical control of plaque with chlorhexidine may be helpful.

Restorative care Greatest problems are posed by mentally impaired. Kind but firm restraint may be necessary—ideally, get the patient's carer to help. A prop (e.g. McKesson rubber) may be needed. It is often easier to use intraligamentary LA technique. Sedation may help reduce the spontaneous movements of cerebral palsy. In some cases there is no alternative but to carry out examination and Rx under GA. In addition, for those patients who can tolerate out-patient Rx, but only a little at a time, it may be kinder to clear a backlog under GA, thus allowing concentration on prevention subsequently. However, this approach requires special facilities and no medical C/I.

Down syndrome ➡ Down syndrome, p. 755.

27 British Society for Disability and Oral Health (↗ <http://www.bsdo.org.uk>).

Notebox:

**Summary points for dentistry for the disabled
(you write here)**

Dental Care Professionals (DCPs)

Dental Care Professionals (previously known as Professions Complementary to Dentistry) are a growth area in dentistry. With increasing demand for dental Rx and restraints on healthcare costs, the advantages of delegating more routine tasks to dental auxiliaries is obvious. There is also improved job satisfaction for all members of the dental team.

The GDC now register and regulate DCPs. This has resulted in a number of changes:

- Any registrant is able to own a practice and 'carry out the business of dentistry'.
- Lists of 'permitted duties' have been replaced by a requirement for all registrants to work within their training and competence.
- Registrants have to attain certain skills and competences before registration in a certain group and will be able to develop additional ones during their career. There are however, some skills which registrants in a particular group would not develop without becoming a different type of registrant because those skills are 'reserved' to other groups.
- All registrants have to undertake CPD. DCPs have to do 150h in every 5-year cycle and of these 50h must be verifiable (➡ Continuing professional development (CPD), p. 738).²⁸
- All registrants need to have professional indemnity cover.
- The requirement to carry out certain treatments under prescription from a dentist was removed by the GDC on 1 May 2013.²⁹

The following classes of DCP are recognized and regulated by the GDC:³⁰

- *Dental nurses*—provide clinical or other support to patients and other registrants. They are not permitted to diagnose disease or treatment plan.
- *Dental hygienists*—help patients maintain their oral health. They are not permitted to undertake any of the skill areas reserved to dental technicians, clinical dental technicians, and dentists.
- *Dental therapists*—carry out certain items of dental treatment under the prescription of a dentist. They are not permitted to undertake any of the skill areas reserved to dental technicians, clinical dental technicians, and dentists.
- *Orthodontic therapists*—carry out certain parts of orthodontic treatment under the prescription of a dentist. They are not permitted to diagnose disease or treatment plan or activate archwires. This grade of auxiliary is widely employed in many countries, including the USA and Scandinavia where their permitted duties may differ.

28 GDC 2012 *Continuing Professional Development for DCPs* (↗ <http://www.gdc-uk.org>).

29 GDC 2013 *Guidance on Direct Access* (↗ <http://www.gdc-uk.org>).

30 GDC 2009 *Scope of Practice* (↗ <http://www.gdc-uk.org>).

- *Dental technicians*—make dental devices under prescription from a dentist or clinical dental technician. They may also repair dentures direct to the public. They do not provide treatment or advice for patients as ascribed to hygienist, therapists, orthodontic therapists, or dentists.
- *Clinical dental technicians*—provide complete dentures directly to patients and other dental devices on prescription from a dentist. They are also qualified dental technicians. Patients with natural teeth or implants must see a dentist before the clinical dental technician can begin treatment. They do not provide treatment or advice for patients as ascribed to hygienist, therapists, orthodontic therapists, or dentists.

Notebox:

**Summary points for dental care professionals
(you write here)**

Lies, damn lies, and statistics

Sugar

- The UK per capita consumption of sugar is >0.5kg/week.
- UK children receive about 1/5 to 1/4 of their energy intake from sugars. Of these 2/3 are added sugars, >2/3 of which come from sweets, table sugar, and soft drinks.³¹
- 65% of all soft drink sales are to <15yr-olds.
- Low-income families consume more sugar/person/day than higher-income families.

Fluoride

- Water fluoridation ↓ caries experience, and increases the proportion of children free of caries by between 5% and 64%.
- A cup of tea may contain up to 6ppm of fluoride. (1 in 3 people in UK take teabags abroad with them on holiday!)
- At equivalent concentrations there is no difference in the efficacy of sodium fluoride or sodium monofluorophosphate-containing toothpastes.³²

Caries

- A reduction of 10–60% in the caries experience of developed countries has been widely reported. This is thought to be due to a variety of factors, including: fluoride toothpaste, ↑ public awareness, changes in infant feeding practices, ↓ sugar consumption, and antibiotics in the food chain.
- In addition, there has been a change in the pattern of carious attack, with a greater ↓ in smooth surface than fissure caries (perhaps reflecting the influence of fluoride).
- Small occlusal lesions appear to be becoming the predominant type of lesion.³³
- *BUT*: there is some evidence to suggest that the ↓ in caries may have slowed down, and may have levelled-out in young children.³⁴

Adult dental health in the UK³⁵

The most recent survey showed that across almost all oral health indicators the trend for improvement seen in previous surveys has continued. However, for those with caries or periodontal problems disease can be extensive. In 2009, 94% of adults had at least 1 natural tooth. 75% of adults said they cleaned their teeth at least once a day (see Table 2.4).

31 A. J. Rugg-Gunn et al. 1986 *Hum Nutr Appl Nutr* **40A** 115.

32 *American Journal of Dentistry*, Special Issue, 1993.

33 A. Sheiham 1989 *Br Dent J* **166** 240.

34 R. Welbury (ed.) 2012 *Paediatric Dentistry*, OUP.

35 Health and Social Care Information Centre (JRC <http://www.hscic.gov.uk>).

Table 2.4 Survey of adult dental condition

	1978	1988	1998	2009
Proportion of adults edentulous	28%	21%	13%	6%
Average condition of teeth:				
Missing	9 teeth	7.8 teeth	7.2 teeth	6.3 teeth
Decayed	1.9 teeth	1 tooth	1.5 teeth	0.8 teeth
Filled	8.1 teeth	8.4 teeth	7 teeth	6.7 teeth
Sound	13 teeth	14.8 teeth	15.7 teeth	17.9 teeth

Child dental health

- The proportion of caries-free 5yr-olds in England and Wales rose from 29% in 1973 to 55% in 1993, thus achieving one of the goals set by the WHO for the year 2000.³⁶ No statistically significant change in decay prevalence was seen in either 5- or 8yr-olds between 1993 and 2003, but the proportion of decayed primary teeth that had been filled had ↓ significantly.³⁷ The 2008 survey did show some further reduction in average caries in 5yr-olds, but this may not reflect a true improvement and may be due to the change from negative to positive consent.³⁸ On average, in England, 30% of 5yr-olds have caries. There is, however, considerable regional variation, with approximately half of 5yr-olds still having decay experience in some areas. The distribution of caries is also highly skewed, with about 80% of caries occurring in 20% of the population.³⁹
- Reductions in levels of dental caries among children in the UK since 1983 were substantially greater in the permanent dentition than those found in primary dentition. However, levels of caries are still substantial. In 2000/1, 38% of 12yr-olds in England and Wales had caries experience in the permanent dentition.⁴⁰
- 54% of 9yr-old children are in need of orthodontic Rx.

Indices

DMFT	decayed, missing, and filled permanent teeth.
dmft	decayed, missing, and filled deciduous teeth.
deft	decayed, exfoliated, and filled deciduous teeth.
dft	decayed and filled deciduous teeth.
DMFS	decayed, missing, and filled surfaces in permanent teeth.
Care index	Proportion of dmft that has been treated by filling (ft/dmft).

36 M. O'Brien 1994 *Childrens' Dental Health in the UK 1993*, HMSO (Ⓔ <http://www.legislation.gov.uk>).

37 R. Harker & J. Morris 2004 *Childrens Dental Health in England 2003*, HMSO.

38 2007/8 5yr-old OH survey England (Ⓔ <http://www.nwph.info/dentalhealth>).

39 N. B. Pitts et al. 2003 *Comm Dent Health* 20 45.

40 N. B. Pitts et al. 2002 *Comm Dent Health* 19 46.

Notebox:
Summary points for preventive and community dentistry
(you write here)