DEVELOPMENT OF INDUSTRIAL DENTAL SERVICES IN THE UNITED KINGDOM

STANLEY GELBIER

Lilian Lindsay Memorial Medal Lecture

11 September 1999

LINDSAY SOCIETY FOR THE HISTORY OF DENTISTRY

Professor Gelbier has had, and continues to have, a distinguished clinical and academic career. He holds the Chair of Dental Public Health in the University of London and is head of the Division of Dental Public Health, Oral Health Services Research and the Schools of Dental Nursing at the Guy's, King's and St Thomas's School of Dentistry of King's College, London. In this last capacity, he heads a team of twenty academics and researchers in the field of dental public health and behavioural sciences. He is, in addition, honorary Consultant in Dental Public Health to a number of National Health Service health authorities. In July this year he was awarded an honorary fellowship by the Faculty of Public Health Medicine of the Royal College of Physicians. Indeed, the numerous bodies, associations and societies of which Professor Gelbier has been chairman or president show him to have been at the forefront of developments in his profession and in dental public health in particular, both in Britain and internationally. His standing in this latter respect is reflected in the large number of his postgraduate students, who come to his department from all over the world or register on his pioneering distance-learning MSc course. He is in particular demand abroad as a lecturer and has especially strong links with public health dentists in Japan.

Interlocking with Professor Gelbier's professional career, has been his long-standing work in the history of dentistry, and it is for his substantial contributions to this field that we award him the Lilian Lindsay Medal today. His doctoral thesis, 'Dentistry and the National Health Service: a study of their interaction', contained a strong historical element, but he also holds an MA in Social and Industrial History and is the only dentist to hold the Diploma in the History of Medicine of the Worshipful Society of Apothecaries. Professor Gelbier's published research into the history of dentistry has concentrated largely on public and industrial dentistry, to which his experience in his professional career has brought unique insights. In addition, he has probably done more than any other member of the Society to foster research and interest in the history of dentistry over a long period, in part through his supervision of a number of postgraduate theses in the field (including a current study of the historical development of dentistry in Sri Lanka). Already a past chairman of the Lindsay Society, he was instrumental in obtaining section status for the dental history group associated with the FDI and was its first chairman. He is currently hon. curator of the museum of the British Dental Association.

All of which makes him a natural recipient of the Lilian Lindsay Medal today.†

† Address given by Dr Christine Hillam, Chairman of the Lindsay Society for the History of Dentistry on the occasion of the presentation of the Memorial Medal, 11 September 1999.

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† This monograph is based on the Lilian Lindsay Memorial Medal lecture presented to the Lindsay Society for the History of Dentistry meeting at the Bodington Hall of the University of Leeds on 11 September 1999.

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PART 1: THE FIRST INDUSTRIAL DENTAL SERVICES

Introduction

It is important to remember that before the United Kingdom established a National Health Service in 1948, dental care was not available to most of the population except for extractions and the occasional fillings. The potential for help came when Asquith's 1911 National Health Insurance Act allowed for a variety of health and welfare care to be provided. The scheme supported free visits to general medical practitioners and the provision of drugs. It also provided cash sickness benefits. The only hospital treatment included was for tuberculosis (with prolonged confinement at a sanatorium).

The scheme was available for all manual workers, irrespective of their earnings, but not their dependants. Non-manual workers only participated if they earned less than £160 in 1911, £250 in 1920 and £420 in 1942 (Honigsbaum 1977, p. 9). Originally, the scheme only covered the over-sixteens, but in 1937 the age was lowered to fourteen years. About 15 million people were covered in 1913; 25 million in 1942 (over one-third of the population). They were mostly working class, the middle and upper classes being largely excluded.

From 1913, insured people became *panel patients* of general practitioners. Originally, there was a weekly sickness benefit of 10 shillings (10s or 50p) for men, with three-quarters of this amount (7s 6d) for women. However, it changed later to a disablement benefit of 5s per week. Also, there was a payment of 30s following the birth of a child (60s if the mother was personally insured).

Although the scheme immediately introduced some general health benefits, the provision of dental and optical care was only to be allowed when the *approved societies* which ran the schemes had 'surplus funds'. No societies had such funds until 1922. Again, they were only available for insured persons, never their dependants. So any facility provided in the work place for all the staff would be a major advantage for the employees. This monograph examines the development of such facilities.

Occupational health and dental services

The need for health care at work came to the fore in the 1700s in a number of European countries. Physicians, manufacturers and company inspectors became aware of the incidence of professional and industrial diseases. The earliest record of an occupational health service in England was at a cotton spinning factory at Quarry Bank Mill in Cheshire. This mill was built in 1774 by Samuel Greg, who created a model environment for workers in terms of social,

mental and physical well-being. Concerned about the health of his employees, in 1796, Greg employed Dr Peter Holland to treat them. This very successful arrangement marked the start of occupational health services in this country (Murray 1992).

The provision of some *medical* facilities in the working environment, is nowadays often taken for granted. However, *dental* treatment at the work place is less well established. Providing such facilities has the invaluable effect of reducing the need to take too much time away from work (Wege 1985). In the United Kingdom, this issue is very important. Twelve million days are lost from work each year because of dental causes (Feaver 1988). It is not surprising that the Nuffield report (1980) mentioned that dental attendance could be encouraged by the use of easily accessible surgeries in the workplace.

Industrial dental services have existed in a number of countries. In some, they are still developing. In others, they no longer function. Krupp established the first German industrial clinic in 1905 (Hopes 1935, p. 308).

In the United States of America, many industrial dental services were established in the period 1915-1916, but the biggest spurt was from 1919 to 1925. By 1911, there had been a dental dispensary at the Armstrong Cork Company's factory in Pittsburgh, Pa., for several years. The factory had 1,200 employees aged 16 to 60 years: 800 were girls (Liedenroth 1915, p. 7). The Heinz Preserving Company, also of Pittsburgh, was similarly equipped slightly later (Belcher 1914, p 1044). In 1907, the Pocahontas Fuel Company was located in Virginia and Wyoming. The General Manager, James Ellwood Jones was interested in the welfare of his employees and was aware of the great neglect of the teeth of their children (Epling 1919). With the cooperation of his family dentist, G. T. Epling, DDS, he established a dental dispensary at Maybeury, West Virginia, where the children could be treated free of charge. Within six months, the directors of the company assumed charge of the dispensary. Realising the need for this type of work amongst its employees, the operation was extended to all of the company's sites. By 1919, there were six dispensaries: two at Maybeury, in McDowell County; Jenkinjones, also in McDowell; and at Itman, in Wyoming County. At each site there are two dispensaries, one each near to the segregated schools for white and black children. The coloured children had 25 per cent less caries than did whites. Each dispensary was located in a double house, the dentist living on one side, the dispensary being on the other side. Several department stores joined in, including the Wanamaker and

the Lord & Taylor stores in New York. The Larkin soap factory in Buffalo, N.Y. also had a dentist in attendance. The Sockham Valves and Fittings Company established medical and dental operations in 1918 as a means of reducing absenteeism and thus increasing productivity, as well as safeguarding the health of the employees (American Dental Association 1980, p. 947). The American Caste-iron Pipe Company established a medical department at its Birmingham plant for employees, dependants and retired workers. Shortly afterwards (in 1924) dental benefits became available. Although many other schemes followed, by 1979 there were only seven corporately owned and operated facilities in the U.S.A. offering comprehensive dental services to employees. By 1996, the only company with an on site dental clinic was Corning Glass, in New York (Cherrett 1996). It was established because glassblowers then

tended to get pretty nasty injuries to their mouths.

As that is no longer the case, although retaining the clinic, the company restricted its use for taking radiographs.

This monograph documents the development of dental services created for their workers by some industrial firms in the United Kingdom. However, it must be recognised that Canada had got there first.

The match factories

In 1890, the Barber Match Company of Canada became the first North American firm to offer in-house dental services to employees because of health and legal worries (American Dental Association 1980). The firm's motivation to provide dental care was closely related to its employees' health. It was concerned about safety and legal liability issues as workers were experiencing a high incidence of phosphonecrosis, which resulted in lower efficiency and increased absenteeism. Examination by dentists suggested that this condition was contracted through decayed teeth as workers handled the sulfur matches.

This problem was not confined to Canada. In 1887, a series of newspaper articles condemned the poor working conditions in British match factories. Their workers suffered from a great deal of phosphorous necrosis, or *phossy jaw*, as it was called. A resultant government enquiry revealed the appalling dental state of the workers. It showed that yellow phosphorous caused bone necrosis in the

presence of infection. The problem had been known for a long time. Twenty-five years earlier, a dental surgeon named Pagett had reported in the *British Journal of Dental Science* on two patients he had treated at St Bartholomew's hospital in London (Hospital Reports and Case Books 1862). Both were makers of wax vestas, or matches, who had suffered from serious bone necrosis. Pagett wondered why Britain still had such problems. He reminded readers that in the fourteen years since 1847, the German manufactury at Nuremburg had only one necrosis case. Pagett said it was due to three meticulous features: perfect ventilation, good cleanliness and regular tooth inspection.

London's match factories

By 1898, the British government was worried about the incidence of phosphorus necrosis in workers at London's match factories. It learned that some action had already been taken in France, so sent a team of experts to investigate the problem in three towns: Aubervilliers, Pantin and Marseilles. The British experts learned that the French government had carried out an enquiry two years earlier. Since then, a number of preventive steps had been taken. Every Saturday morning, a set of warnings was read out to the workers: no food or drink could be brought into the workshop; their working clothes had to be removed both before meals and at home-time, hands had to be washed with soap and water; and the mouth was to be rinsed with an antiseptic 'gargle'. The firm was careful about the people it took on as workers. In particular, it would not employ anyone under 16 years, nor anyone who had 'organic or contagious disease', had not been vaccinated or who had carious teeth.

The British government was impressed by the French action, so it decided to take similar precautions. It sought help from George Cunningham, a Cambridge dentist. He was asked, initially, to advise on safety for workers at the Bryant & May match factory, where there had been a necrosis death. Cunningham immediately went to France to review the situation. After presenting his report, compulsory dental examinations were recommended for U.K. employees, plus insistence on personal hygiene. Eventually, a two chair dental clinic was established at Bryant & May's London factory.

The Great Western Railway Medical Fund Society

By the beginning of the twentieth century, a few leading British industrialists had begun to take a paternalistic interest in the health, welfare and

education of their employees. In 1905, realising that their workers would benefit from good dental health and education, Messrs. Cadbury Limited set up an industrial dental clinic at its Bournville factory: W. Courtney Lyne was the first dentist. His successor, T. P. Wolston Watt (1920), claimed that Cadbury had provided the first such clinic. However, this suggestion must be challenged. The Great Western Railway Medical Fund Society's dental department had been established earlier, in 1887.

In 1847, the GWR Medical Fund Society was established (MacMillan 1929, p. 807):

> To provide for its members - employees of the GWR whose homes are in the Swindon area - and their families, medical an surgical attendance and medicine, and the promotion of the health of its members and of their families by such means as may from time to time appear necessary or desirable.

In 1928, J. Mathieson MacMillan, chief dental surgeon to the scheme, wrote an article in the *British Dental Journal* comparing the use of clinics *versus* panels in the dental treatment of insured persons. Based on an extended experience of both systems, he had no hesitation in advocating clinics for *all* members of the industrial classes, insured and uninsured. On the whole, it meant greater comfort and better treatment for the patients and better conditions of life for the average dentist engaged in industrial practice.

In 1929, in order to carry out the comprehensive provision mentioned above, the Society provided all the services shown in Figure 1.

- eleven whole time medical officers including:
  - a consulting physician (who was also the chief medical officer)
  - a consulting surgeon
  - assistant surgeon
  - anaesthetist;
- services of a consulting radiologist and pathologist when required
- an accident and general hospital
  - with thirty-six beds
  - matron
  - seventeen nurses
  - x-ray department in charge of a radiographer
- a dispensary with eight dispensers

- with nine consulting rooms for doctors
- tickets of admission to various hospitals and convalescent homes
- washing and Turkish baths
- two swimming baths
- provision of medical surgical, dental and sanitary appliances
- invalid chairs and 'shillibiers'
- lime, lime brushes and disinfectants
- lectures on health

Figure 1: Medical staff and services of the Great Western Railway Medical Society in 1929

With the exception of the dental appliances and a few minor exceptions, all of the benefits were available for a weekly contribution by the members. The G.W.R. Medical Fund Society's income came from those contributions plus the State's contribution of fees in respect of people allowed to make their arrangements with the Society. In view of the mutual advantages of the Society, G.W.R. deducted the weekly contributions from people's wages.

Single members over sixteen years of age paid two pence (2d) per week if insured, 4d if not. Married members contributed 3½d (or 5½d) and retired members without dependants paid ½d (1d). These rates included cover for a wife and any number of children.

An important feature was that the Society was under the management of the workers themselves, with the

> friendly cooperation of the company who employs them.

The chief mechanical engineer of the firm was the ex-officio president, and the vice-presidents were usually chosen from the company's principal officers. There was an elected committee of management in the proportion of one to every 1,000 members. The committee elected its own chairman. There was also a whole time secretary, assistant secretary, two clerks, a part-time treasurer and auditors.

In 1929, the Society was outside the provisions of the 1911 National Health Insurance Act. It was thus able to conduct its own affairs without State interference. By then, there were 15,614 working members plus 2,009 retired

members and widows. Adding in wives and children, the total number of people eligible to receive benefits was over 40,000.

The Dental Department

The dental department was added in 1887 (MacMillan 1929, p. 810). By 1929 it had three fully equipped surgeries. John Mathieson MacMillan, LDS FPS (Glas.) [gained in 1892], LRCS, LRCP (Edin.), LFPS (Glas.), was the chief dental surgeon. In addition, there were three whole time assistant dental surgeons, two dental nurses and six mechanics. The surgery hours were 9am to 7.30pm (Saturdays 9am until 12.30pm); it was closed on Sundays

Each dental surgeon worked a 30 hour week, arranging to cover the evening sessions in rotation. In return, they had the Saturday free. The chief was paid £850, his assistants £450 to £500. The chief had one month's vacation and the assistants two weeks.

In 1929, the work of the department consisted largely of scalings, plastic fillings and supply of vulcanite dentures. There were occasional inlays, crowns, metal and combination metal with vulcanite dentures and tooth straightening. In addition, there was a considerable amount of oral surgery, including treatment of innocent growths, fractures, antrum and 'tongue cases'.

Patients paid £7 for a full set of dentures, including the extractions. There was a nominal charge of 2s 6d for simple plastic fillings. Scaling was free of charge to encourage younger members of the Society to look after their teeth. There was no charge for casual extractions with local anaesthetics, nor for oral surgery. They were provided for by one third of the salaries of the dental surgeons being charged to the general funds of the Society. Gold fillings, inlays and crowns cost one guinea. (p 814). With the exception of two approved societies, with which special arrangements were made for insured members who presented a *dental letter*, G.W.R. had accepted an agreed scale.

All the patients' charges were collected by the secretary. It was to him that members wishing to obtain dental advice applied. After verifying their membership he sent an order to the Dental Department, whose nurse arranged an appointment. Where a charge was to be made, the order was made out in duplicate and the chief dental surgeon entered the amount to be paid on both sheets. One copy was returned to the patient. On completion of treatment, the other sheet was passed to the secretary for collection of charges. Payment could

be made by instalments, the secretary arranging to collect them by deduction from the weekly pay packet.

Patients generally came by appointment. However, people in pain could present without appointment, priority being given to workmen from the factory 'on pass' (i.e. pay was lost whenever they were not working). Wherever possible they were seen immediately. Indeed, other patients sometimes gave way to them.

The chief dental surgeon was 'entirely independent of the medical department', being responsible directly to the Society's committee for the running of its dental department. Indeed, MacMillan (1929, p 816) indicated:

> I personally would not accept such an appointment on any other basis, as I hold that in the interests of the patients the specialist must be supreme in his own department.

Nevertheless, there was close cooperation. Patients were constantly referred to the dental department by members of the medical staff, for advice as well as for treatment. It was thus an ideal opportunity for 'teamwork'. In 1929, MacMillan said he hoped the time would come when all members of the Society presenting for *medical* advice would be required to show a clean bill of *dental health* before general treatment was undertaken. It was already the routine practice with regard to hospital patients requiring any major operation (p 817).

MacMillan (1929, p. 818) took the opportunity to take up an 'inference' in a *BDJ* editorial referring to his article on 1 May 1928, that:

> the conditions at Swindon are exceptional,

with many workers receiving sympathetic support from the employers. Although readily admitted, he pointed out that the system could easily be extended to the whole population of Swindon:

> It was only a matter of intelligent organisation.

Dental health education

Dental health education was well to the fore. On the advice of its chief dental surgeon, the Society distributed pamphlets supplied by the Dental Board of the United Kingdom (forerunner of the General Dental Council). Members of the Society were addressed by lecturers supplied by the Board. The general public,

as well as all members of the medical and dental professions practising in the town, were invited to attend. The lectures were illustrated by 'lantern slides and cinema pictures'. In addition, the chief dental surgeon delivered lectures on 'The importance of the care of teeth to the maintenance of general health' to hospital nurses, the Women's Cooperative Guild, The Women's Fellowship Society and the Women's Branch of the Independent Labour Party.

Whereas the G.W.R. medical and dental schemes were run by the workers through its Medical Fund Society, dental clinics elsewhere were run by the firms themselves.

PART 2: DENTAL HEALTH AND THE CHOCOLATE FACTORIES

Even today, chocolate factory workers are a high risk group for oral disease, probably due to the accumulation of plaque induced by a high level of sugar dust in the air (Petersen 1983). It is thus perhaps not surprising that amongst the first U.K. industrialists to take an interest in the health and welfare of their workers, were the chocolate manufacturers Cadbury, Fry and Rowntree. Realising that their employees would benefit from good dental health and education, in 1905, Messrs Cadbury Limited set up an industrial dental clinic at its Bournville factory. Although T. P. Wolston Watt, the dentist who took over in 1908, claimed that Cadbury had provided the first such clinic (Watt 1920), it had been beaten by Rowntree.

Rowntree of York

In October 1904, the *Cocoa Works Magazine* of Messrs. Rowntree and Company Limited, cocoa and chocolate manufacturers of York, reported that its directors had appointed Herbert Grimsdale Ashby, LDS Eng. [1893], to be a dental surgeon at their works. The magazine indicated that

> Mr Ashby's skill and experience are at the service of any employee.

Thus was Ashby introduced to the employees of the cocoa works. He remained with Rowntree until June 1917, when ill health forced his retirement. To him must be credited the establishment, success and growth of the dental department.

According to Ashby's successor, Alan Charles Bloomer, LDS Birm. [1916], who took over in 1917 (Bloomer 1921), the directors had installed a dental department and extended dental treatment to the employees as part of their general welfare work in the hope that it would benefit the health of the workers and add to the efficiency of the business. The firm endeavoured to give 'qualified treatment' and to encourage preventive measures against ill health. No special forms of treatment were adopted. In addition to employees, pensioners of the firm were eligible for treatment.

The clinic was run like a private practice with patients coming on a voluntary basis. Bloomer said that the wishes and requests of patients were considered, but

> if consistent with scientific treatment, the work was done.

At first the results were discouraging, but staff soon realised that it was better to receive complete treatment rather than only temporary relief.

By 1921, a full-time qualified dentist was employed. He worked closely with the works medical officer, nurse and social workers. They often helped to overcome any difficulties and persuaded those workers who needed 'friendly support'. During periods of planned absence, a locum dentist was employed.

Any employees who wanted to visit the dentist informed their 'overlooker' on arriving at work in the morning. Special requisition forms were filled in, giving the date, name, works number, department and telephone number, plus signature of the overlooker. These slips were collected from each department and delivered to the dental department by 9am every day. Patients who wrote *pain* on their form were sent for immediately. The rest came in batches of about six at a time, each group overlapping so as to avoid wasting surgery time. That day's applications were dealt with in the mornings, with appointments confined to the afternoons. Urgent cases arising during working hours telephoned the surgery and were seen as soon as possible.

Rowntree's directors were far sighted enough to see the advantage of the dentist keeping himself up-to-date, so allowed him to hold an appointment as honorary dental surgeon to the York County Hospital. Thus, any patients referred there could be seen by the same dentist. The directors felt that this arrangement helped patients to lose the 'hospital dread' which Bloomer said was prevalent.

If preferred, the dentist extracted teeth in the patients' own homes, their panel doctor usually acting as anaesthetist. For other cases, general anaesthetics were provided at the factory by the works medical officer, on one morning a week, the sexes being kept separate. Should 'gas and oxygen' be contra-indicated, the use of ether at home or in hospital was suggested.

The cost of the clinic was borne by the firm, which attempted to recover only the cost of materials used (excluding ordinary filling materials). Although not financially self-supporting, the time-saving alone seemed amply to justify the upkeep of the dental department and its staff. Indeed, in 1935, Seebohm Rowntree wrote to *The Times*:

> Over a quarter of a century ... I have not the least doubt that the many housands of pounds that have been spent on maintaining it (i.e. the medical service) at a high level of efficiency have been well spent. There is no philosophy about it, it is a pure business proposition which benefits both employers and employed.

He felt equally supportive of dental clinics.

Cadbury of Bournville

Cadbury's dental scheme began in 1905. Wilfred Courteney Lyne, LDS Eng. [1902] was the first dentist. All youngsters wanting a job at Bournville had to pass an education test. In addition, for many years they had to attend a compulsory continuation school until the age of 18 years. Included, were talks from the factory dentist during their first week of employment. Lectures on the structure and care of teeth were illustrated by 'blackboard drawings' and 'lantern slides'. Provision was also made for tuition in gardening, gymnastics, swimming and athletics: there were large playing fields plus indoor and outdoor swimming baths. All of the above plus dental treatment had to be authorized by parents of the under-16s as a condition of employment. Not surprisingly, it was claimed that the average physique of Cadbury's employees was decidedly better than other young people of their age.

Prevention to the forefront

Dental health education programmes were important early components of the scheme. 'Care of the teeth' charts were hung in lavatories and other prominent places, lectures were given and occasional articles on dental subjects were written for the monthly *Bournville Works Magazine*, edited by a member of the staff.

Initially, Cadbury's youngest factory employees had their teeth examined and treated free of charge, conservative care being the main object. Next, all applicants for employment aged less than 16 years were examined: they had to be treated as soon as possible after employment. At the outset, the chief difficulty encountered was ignorance of parents with regard to the value of treatment (Publication Department 1922) and, to

> a less degree, fear of the dentist on the part of young employees

However, the latter was soon replaced by 'smiles and confidence'. Eventually, dental treatment became a condition of employment at Bournville for all the under-16s; extended to the under-16s by 1925 (Publication Department 1922). There was then periodic inspection and treatment until the age of 18 years. The dentist said (Watt 1920) it was apparent that:

> Hardly any of these young people were addicted to the use of the toothbrush.

In general the service was free, but patients paid for denture materials and time spent by the mechanic on constructing false teeth. Toothache or any other serious condition was given immediate attention (Watt 1922).

The need for the regular use of the toothbrush (often a duty relegated to the Sabbath 'clean up') was emphasized. The under-16s were given free toothbrushes and powder. The firm felt that older employees earned enough to pay a 'nominal charge' for the brushes, powder and mouthwashes, which were sold at convenient places throughout the factory. In time, it became the exception rather than the rule for employees to have dirty teeth.

Links with local schools

As no-one living further than three miles from Bournville could be employed at the factory, most of the junior workforce had been educated at one of four local council schools. Until school dental services were instituted, Cadbury's supplied all the local school children with free toothbrushes and powder. Head teachers only had to send a note to the works' dentist for free supplies to be sent. The school in turn undertook toothbrush inspection and toothbrushing drill.

By 1908, Thomas Percy Wolston Watt, LDS Edin. [1897], had replaced Courteney Lyne. He negotiated plans for a large building so that the dental staff could be considerably augmented. The ground was cleared, but the outbreak of

war in 1914 delayed building. Nevertheless, by 1920 there were two surgeries, a waiting room, small recovery room and a tiny workroom. Long before dental surgery assistants were employed routinely elsewhere each dentist had an attendant to look after his instruments and carry out clerical work. Toothbrushes and powder were sold by the recovery room attendants, former works employees who had received ambulance and nursing lectures.

Where possible, a local anaesthetic was used. If needed, the dentists took it in turn to administer general anesthetics for each other. Indeed, they also provided anaesthetics services for the medical department for the 'minor operations' carried out there, including

> finger amputation and the lancing of abscesses.

The 1920s

By 1920, some 1,650 under-18s worked at the factory. Nevertheless, it was felt that something should be done for the older employees. They were therefore allowed to attend for advice, as well as for the relief of toothache. Regular care was later extended up to the age of 21years; and for girls during the whole of their employment at Bournville. During 1920, some 2,000 patients visited for toothache. Watt (1920) wrote:

> It does not require much business ability to see that it pays to have... (them) relieved of pain and back to their work within an hour say, rather than that they should either put in a day of poor work or take half day off to go outside and visit a private practitioner.

How better can one sum up the value of an industrial dental service?

Dentures were provided at a very small cost. However, there was emphasis on preventive care. When examined or seeking advice, each patient was instructed on toothbrushing. Brushes and dentifrice could be obtained from the nurse at cost price. From time to time illustrated lectures were given and occasional articles on 'Care of the teeth' were published in the *Works Magazine*. Leaflets indicating the possible results of decayed teeth and oral sepsis and advising brushing the teeth and keeping the mouth clean were distributed to the workers.

Care for health at Bournville was considered under three headings (Publication Department 1922, p. 1):

a) for the public it ensured that the firm's products were pure and wholesome - a first essential in a food-producing factory;
b) workers were relieved of many anxieties attached to the incidence of sickness in themselves and their families, to say nothing of their own bodily comfort and well-being;
c) the firm - apart from any humanitarian considerations - obtains an efficiency and stability in his labour-force resulting from a healthy, contented worker, the minimum time-loss through ill health, as well as the confidence of a sensitive public in its manufactured goods.

The Bournville village

Cadbury Brothers recognised the

> mental and moral effect of the environment

on its workers. In 1879, the firm moved its factory from Bridge Street in the heart of Birmingham to Bournville. In that same year it started to develop the Bournville Village, although many buildings dated from 1895. In 1901, George Cadbury handed over the whole property to a body of trustees 'on behalf of the nation'.

The village provided a healthy environment for the workers and their families. Whereas, for the five years ending 1919, in England and Wales the death rate per thousand was 14.9 and in Birmingham 13.7, in Bourneville it reduced to 7.7. The infant mortality rate was 97 per 1,000 live births in England and Wales, 101 in Birmingham and 51 in Bournville. At age 12 years, Bournville children were 2.5 inches taller than those at the Floodgate Street School in Birmingham; the girls were 2.11 inches taller (Publication Department 1922). Clearly, the Bournville children were far healthier.

The erection of the factory in a country district outside the large town, the preservation as far as possible of natural features making for beauty inside the factory and in its surroundings, the hiding of bare brick walls by climbing plants, use of decorative flowers and plant in dining and workroom, the encouragement given to organize singing at work all these helped to elevate and refine the mind and spirit, and of the course the physical health, of the workers.

Medical and dental accommodation

In 1920, the accommodation for medical and dental staff lay just outside the factory, but was connected to it by a covered bridge. The dentists' rooms faced north, with large windows to admit the maximum amount of steady light (Publication Department 1922, p. 19). The firm employed three full-time dentists, two mechanics and four attendants.

J. S. Fry of Bristol

> From the delightful lands of the Tropics, from which in the early 18th century sailed those ships bearing the delectable cocoa of the house of Fry, to the subject of industrial dentistry, it is a very far cry.

Thus wrote William Holder Shipway, LDS Bristol [1917], LDS Eng., the dentist to Messrs. J. F. Fry and Sons Limited of Bristol. He suggested (Shipway 1921) that the importance of industrial dentistry had for many years been recognised by the directors and their employees. Dental treatment was a condition of employment for youngsters (mostly females) under the age of 16 years, as was attendance at the firm's day continuation school. Education in dental matters went hand in hand with education in other things. Where their dental condition was very poor, girls were advised to get the defect remedied by an outside practitioner or at a dental hospital. They were then allowed to return to the factory. Such action was not often necessary.

Once accepted for employment no systematic dental care was provided during the month of probation, although toothaches were dealt with. From then onwards patients were called for treatment in the order in which they were originally seen. A telephone connected the dental surgery by private line to every department in that building, plus all other factories in Bristol belonging to Fry.

Shipway (1921) wrote:

> It has been found that the accepted theory as to the causation of dental caries does not in many cases hold good.

He went on:

> While one would not deny that lactic acid fermentation has something to do with caries, yet it has not most to do.

Shipway suggested that neglect of prophylactic measures seemed to be one great factor, but it was being rapidly remedied by education. The other factors were

> correct dietetics and regularity of life.

He said that practical experience confirmed the view put forward by Broderick that there is a connection between

> vitamine (sic) deficiency, endocrine derangement and dental caries.

Shipway made no mention of the possible involvement of sweets or chocolates. Perhaps that would have been imprudent coming from a dentist working for J. S. Fry and Sons Limited; and he probably would not have known about the dangers of sugar-in-dust.

Although the chocolate factories were amongst the most important originators of the industrial dentistry movement, there were some other noteworthy contributors.

PART 3: SOME OTHER DENTAL SCHEMES

Peek Frean of London

In 1905, a dental clinic was established as part of the existing medical department of Messrs. Peek Frean and Company Limited, biscuit manufacturers of South East London. A. S. Cole, employment manager at the factory, later emphasized (Cole 1926, p. 249) that:

> Health is largely dependent on the prevention of the ailments which have as their origin defects of the teeth.

The dentists attended on two mornings per week, often plus Saturday mornings. By 1926, two dentists covered every weekday morning from Monday to Saturday. From the beginning, attendance was voluntary. When the clinic was established, it was felt that public opinion would not allow the imposition of compulsory treatment. Cole said that a noteworthy feature of dental treatment was the desire on the part of the majority of the rising generation of workers who have been treated by

> that most important official, the School Dentist

to continue the care of their mouths.

All treatment except for the provision of dentures, was free of cost to the employee. Employees who had worked for the company for more than three years only paid half the cost of the dentures, the remainder being paid by the company. Retired long-service employees paid nothing. By 1926, when any payment was due, the Employment Department arranged terms for payment, possibly by weekly deductions from wages of amounts between one and five shillings per week. The dentist was paid for the dentures by a quarterly cheque from the company.

Many patients were insured under the National Health Insurance Scheme and some by the Hospitals Savings Association. They could make a claim that further reduced the cost to themselves.

On arrival at work, employees wanting treatment wrote their Employment Ticket Number on a form held in all the departments. They were collected and sent to the 'surgery maid' who telephoned appointments to the departments. Each patient carried a form on which were noted the times of leaving off work, arrival at the surgery and leaving the surgery. Employees were paid normally for the time thus accounted for.

The firm was sure that the dental clinic prevented a great deal of sickness amongst the employees, thus avoiding absence and consequent loss of work. It was convinced that the saving to the company in monetary value during the twenty years the clinic had been in existence far outweighed its actual cost. The benefits to the employees were manifest in the prevention of sickness and absence from work with its consequent loss.

Reckitt and Sons of Hull

In 1905, Messrs Reckitt and Sons Limited called in a dentist, John Charles Storey, to advise on, and organise, a scheme for the care of 2,000 girls. He gained his LDS Ireland in 1881; but had practised dentistry from 22 July 1878. He suggested that the firm should initially make an arrangement with a local dentist to superintend and organise a scheme for six months (Storey and Findley 1914). The latter would supply an assistant to work at the factory for three to four hours daily. Later, the principal would attend occasionally

> for not less than one and a half hours each week.

Apart from anything else, he would be available 'for consultations on special cases'. In response, Reckitt set up a fully-equipped dental surgery measuring 14 feet by 12 feet, with an attached waiting room. Storey was appointed as the dentist. According to Blight (1914), the service was established in 1909.

During the first year treatment was confined to girls aged 15 to 21 years. However, they were compelled to accept any care which was offered. Treatment was virtually free. General anaesthetics and dentures were provided at half the cost of hospital rates. In the first three months, nearly half of the girls refused treatment; it fell to one-third in the next quarter. Within six months treatment was compulsory for all new gitrls.

Within twelve months, it was necessary to appoint a full-time dentist. By 1911, over 4,000 patients had been made dentally fit. All boys and girls were examined upon employment. For them, any necessary scaling and cleaning of teeth, fillings and extraction of septic roots, was compulsory. However, treatment for the over-17s was voluntary. A part-time nurse and a doctor attended for two hours each week for the administration of nitrous oxide general anaesthesia. At that time a mechanic's workshop was equipped.

Treatment up to the age of 17 years was free of charge. For the others, a small fee was charged for each extraction except when artificial dentures were provided. Cleaning, scaling and fillings were done free of charge (Storey and Findley 1914, p 241)

> in order to encourage and educate the workers to preserve their teeth - so important in maintaining good health.

By 1922, employed staff included a whole-time salaried dental surgeon, Arthur Renwick Lambie, LRCP, LRCS Edin., LDS Glas. [1915], plus a dental mechanic, a nurse and a nurse's assistant (Lambie 1926). He was thus better qualified than most industrial dentists, the majority of whom had only an LDS qualification from the Royal College of Surgeons of England; i.e. Lambie was medically as well as dentally qualified. Nevertheless, at least they were *qualified*. We must remember that in this pre-1921 Dentists Act era, it was still possible to be an unqualified and unregistered dental practitioner.

Crawford's of Liverpool

Another firm to set up a programme was William Crawford of Liverpool, a biscuit manufacturer. It established a dental clinic in 1909.

W.D. and H.O. Wills of Bristol

In 1912, Messrs W. D. and H. O. Wills of Bristol decided to start a dental clinic on its premises. Frederick Cecil Nichols, MC, MB, ChB, MRCS, LRCP, LDS Eng. [1906], was appointed as the dental surgeon. Similar provision for care had been made at Wills' other factories, but mechanical work for Swindon was carried at the main Bristol factory (Nichols 1921).

The dental clinic was part of the social work of the firm, which included convalescent homes, athletic grounds and so on. The medical officers, the principal matron and her assistants were extremely valuable in many cases. Their cooperation in the smoothness of working and help with difficult patients, especially new young employees, was gratefully acknowledged by Nichols.

During the war years, Norman Harold Kettlewell, LDS Eng. [1913], carried on the Bristol clinic. He later transferred to Wills' factory at Swindon.

Anyone wanting to see the dental surgeon had to inform his or her foreman or forewoman who sent to the surgery each morning a signed slip with the employee's name and department. If urgent, it was marked in red ink. These patients were seen as soon as possible, as were any emergencies.

Employees were examined by the medical officers who, if they thought it to be necessary, sent them for dental examination. Any treatment advised was completed after first seeking permission from parents in the cases of juveniles. Unfortunately, in many cases conservative work was impossible. Nichol explained that in the working class district where the factories were situated there was a 'quack' practitioner, whose teaching for years had been extraction and whose conservative work was practically nil. Indeed, in many patients' words,

> I have always had them out soon after.

Thus, employees frequently would not return to the surgery for completion of fillings but go to an outside quack to have the tooth extracted.

The clinic was managed as a private practice. Nichols said treatment was provided in every way as in my own private practice. So Nichols was not full-time. Clifford Morley John, LDS Eng. [1917], worked with him at the factory. Fees paid by employees were fixed by the management although there was no charge for amalgam or synthetic fillings or for the administration of novocain local anaesthetic. The cost of nitrous oxide and oxygen general anaesthetic was

one shilling per session. Needless to say, the cost of the clinic was not covered by the patients' contributions, so the firm subsidized them.

Apart from dentistry, other benefits were provided for the employees. For example, large dining rooms were provided where excellent meals at nominal prices were available. Nichols wrote:

> Life in Messrs Wills's beautifully kept factories with its regular hours, meals & c., has a beneficial effect on many of the younger employees, who start their working life with a poor physique.

PART 4: SOME MAJOR INTER-WAR DEVELOPMENTS

The additional dental benefits which became available to some workers in 1922 under the 1911 N.H.I. scheme made only a small difference, to a few people. It was thus realised that industrial dental schemes were still needed.

Mather and Platt of Manchester

In January 1923, it was decided to build an extension to the existing First Aid Room at Mather and Platt's Park Works, in Manchester, for use as a dental room (James 1926). The dentist was Vincent James [an unqualified *dentist-1921*]. In 1926, the clinic was open on two mornings each week. Treatment was initially limited to boys aged 14 to 18 years. At the outset each boy was given a toothbrush and information on how to use it. Most patients appreciated the care. However, a parent would occasionally object to teeth being filled, usually due 'to ignorance'. A chat with the parent usually put the matter right. Later, a clause was inserted in the contract signed by parents before their sons were accepted for work (James 1926, p. 204):

> Each boy will be examined by our Works Dental Surgeon and will be expected to undergo any treatment which may be necessary to ensure a healthy condition. Dental treatment is provided free.

In the first two years, 222 boys were made dentally fit. There were 419 examinations/re-examinations, 1,004 fillings and 433 extractions.

London General Omnibus Company

As pointed out in an article in *Oral Topics* (Anon. 1927, p347) toothache is troublesome at any time, but it is

> particularly detrimental to the omnibus driver or conductor whose daily work in the crowded streets is extremely trying.

It is thus not surprising that the Society established a dental suite in 1925, at its premises in west London's Warren Street. Mr John Speak, LDS Eng. [1916] was appointed as the dentist in charge. The facilities included three surgeries, a pleasant waiting room, an office and a dental laboratory. Within two years the number of employed mechanics rose from one to fourteen, reflecting the number of dentures which were being constructed. As this suite could not cope with the load, another facility was established in 1927 in Brixton, south London.

In 1926, the Society's dentists treated 3,101 patients on 15,889 visits. In just under 2 years 2,237 dentures were fitted.

Chloride Electrical Storage Company of Manchester

This Manchester firm established a dental surgery at its Clifton Junction works in 1926, under the supervision of William Henry Lumb, HDD, LDS Eng.[1923] (Anon. 1926). Unusually, he had an additional dental qualification, the Higher Dental Diploma. The clinic consisted of a surgery, rest room and recovery room. The employees were subject to a small charge for treatment, except for the under-21s. Before employment all applicants had to pass a dental, as well as a medical, inspection.

Lever Brothers of Port Sunlight

According to J. P. Flynn, LDS (1926). Lever Brothers put their "mature dental scheme' into operation in the 'period of reconstruction after the end of World War I'. The factory and offices at Port Sunlight employed 13,000 people. It had been the firm's policy for a number of years, that any dependants living in the village should also enjoy the benefit of its welfare institutions. This policy extended to the dental clinics. In addition, special facilities were provided for people outside the factory who were connected in some way with the firm. A surgery plus waiting and rest rooms were established in the factory, mainly for emergencies and for treatment of the under-18s. Upon employment, all were

medically and dentally examined. Following agreement of the parents, all treatment was given in working hours, free of charge.

For adults, there was another surgery in the village, with a laboratory attached. It ran as a private practice, with patients paying fees similarly to those charged under the NHI panel scheme. There was a nearby cottage hospital where 'major operative cases' could be treated and patients

> assured of the necessary after-care.

Lord Leverhulme frequently stated that the scheme was not charitable (Flynn 1926, p. 248), it was:

> a sound business proposition whose return showed improved health for the employees and much saving in lost time and efficiency.

Gimson Shoe Machinery Company of Leicester

Captain Leask, the company's Welfare Superintendent, wrote (Leask 1926, p 502):

> One of the principal reasons for opening the [dental] clinic was that the younger employees should be able to have periodical attention and so to bridge the gulf between the period of leaving the care of the School Clinic and becoming entitled to treatment under the Health Insurance Scheme.

Leask doubted if any other dental clinic existed in an engineering works. In the Ulverscroft works itself, only males were employed. However, female employees from other parts of the firm also enjoyed the dental facilities. The clinic was open on Tuesdays and Thursdays. Two dentists from a partnership in the City of Leicester attended to provide care, which

> considerably helped towards making the venture popular with the employees.

Treatment was voluntary. Up to the age of 18 years care was free, with dental inspections at four-monthly intervals. Upon employment, parents were asked for their support and interest in the scheme. By 1926, only one parent had refused.

From the age of 19 years, examinations were free. Payment was at the usual adult rate, but could be paid off at weekly intervals. No pay was lost for

taking taking time away from work. Table 1 shows the treatment given in 1925. It is interesting to note the reversed ratios of fillings to extractions between the two age groups.

	18 years and less	**Over 18 years**
Extractions	42	233
Permanent fillings	140	101
Temporary fillings	102	76
Scaling and polishing	33	28
Examination, treatment not required	24	8
Sets dentures		19
Repairs and additions to dentures		3
Gold inlays		1

Table 1 Treatment in 1925 at the Gimson Company

Prevention was to the fore, with advice being given at the chairside and on posters displayed throughout the works. The messages included (Leask 1926, p. 95):

> Spare the brush and spoil the teeth.
> A tooth in the mouth is worth ten on a plate.

R. A. Lister and Company of Gloucestershire

1931 saw the establishment of a medical and dental clinic at the engineering firm of R. A. Lister of Dursley, Gloucestershire. It provided care from the start for all employees. G. A. Lister, a company director, said the idea started at a meeting between representatives of the firm and the employees, when the subject of sickness was raised (Anon. 1931, p 399). The employees had a number of difficulties:

> Living considerable distances from their work, they did not seek the advice of their doctor when they should, the result being that when they did see him they were away from work longer than would have been the case had they consulted him earlier.

As a result, the company decided to establish medical and dental clinics.

Two local dentists attended on alternate days, in the lunch hour. Employees who were members of an approved society paid for treatment according to the rules of their societies. Others paid slightly less than the usual charges paid by patients attending the dentists' private surgeries, as the firm supplied the equipment and materials.

PART 5: THE MARKS AND SPENCER NATION-WIDE SCHEME

In 1934, Joshua Levi, LDS Eng., submitted a draft dental scheme to the directors of Marks and Spencer Limited (Levi 1947, p.143). By then, over 150 large firms who were members of the Industrial Welfare Society operated a dental scheme, as did many outside of the Society. Marks and Spencer agreed to try out Levi's ideas. It involved the part-time use of private dental practitioners

> whose skills had been heightened by competition and the desire to increase their practices and thus their income.

Discarding the commonly used scale of fees system of payment, Levi recommended reserving a regular portion of time for sessions to be devoted to treating groups of workers, for which the dentist would be paid at an inclusive hourly rate.

By 1947, the year before the National Health Service started, the M&S scheme was country-wide, covering all the company's stores. Two variations were in operation: the original one in which the dentists were paid an hourly rate irrespective of the type of work they did; another where they were paid on an item-of-service scale of fees. Both groups of dentists worked in their own practices using their own equipment and materials. Levi demonstrated that the method of payment had little effect on the type of treatment given. However, he claimed that the sessional scheme provide a better general standard of service.

Levi (1941) pointed out, in an article written for the journal *Industrial Welfare and Personnel Management*, that when the directors of Marks and Spencer decided to formulate a dental scheme for their employees, they asked him for advice. He thought that

> the public interest would best be served by making selective use of the existing organization of private practice.

However, Levi faced one difficulty. Especially in the poorer industrial areas there were many dentists

> who had neither the necessary knowledge, skill or equipment for saving teeth, nor did they do anything but encourage the industrial population to become toothless at an early age in order to supply them with sometimes ugly and not always efficient 'full sets'.

He felt that it was essential for any scheme to be under the control of a consulting dental surgeon or dental superintendent, responsible to the welfare department of the firm for its administration and conduct, with the financial arrangements remaining in the hands of the firm. Levi (1941) was thus stressing a need to keep the dentist from subordination to the medical officer ('a queer idea') or even a lay committee,

> both equally ignorant of dental problems.

In 1936 there were 3,260 attendances and 313 failed appointments. By 1939, the figures were 4,029 and 149 respectively, a major improvement (Levi 1940, p.216).

Table 2 shows the charges applicable to all permanent employees earning under five pounds per week. The average payment by patients in 1940 was 28 shillings. All other treatment was charged according to the cost of the materials, e.g. gold or platinum. The mechanical work was centralised at one laboratory to ensure consistently high standards.

Item	Shilling (s) and pence (d)	Comments
Extractions	2s 0d	1s after 3 teeth
Fillings	3s 6d	
Root treatment	3s 6d	
Scaling	3s 6d	
Anaesthetics	3s 6d – 10s	According to number of teeth
Crowns, porcelain	12s 0d	
Dentures	15s 0d	For one tooth
	£1.14s. 6d	Maximum

Table 2: Costs of dental procedures in 1940

In 1961, Hugh Squire reported that

> despite the national increase in dental disease the dental health of its Company's [i.e. M& S's] staff continues to improve.

Of the 73.4 per cent of the total staff examined, there was an overall reduction in extractions and fillings of 3.6 and 4.4 per cent respectively. For junior staff, the reductions were 6.5 and 6.7 per cent (BDA Information and Announcements 1962).

In 1973, an experimental dental health education programme was started. By 1975, it was extended to all the employees. Seventeen part-time dental hygienists were employed for this programme, which provided oral hygiene talks to 13,000 employees at the stores (BDA Notes 1976).

Over the years there were a number of Dental Superintendents, later titled Chief Dental Officer (see Figure 3). The M & S scheme grew and changed over the years, but it still exists.

1934	Joshua Levi, LDS Eng. [gained 1925]
1955	Hugh Noel Squire, LDS Eng. [1926]
1964	William Bain Balderston, LRCP, LRCS, LDS Glas. [1936], LRCP, LRCS, LRFPS Glas.
1977	Graham John Barnby, BDS Sheff. [1965]
1991	Gerald Peter Feaver, BDS Lond. [1976], LDS Eng., DGDP (UK)

Figure 3: M&S Dental Superintendents/ Chief Dental Officers

PART 6: THE SECOND WORLD WAR

English Electric Group of Companies

Wartime conditions made it necessary to provide additional support for workers, be it in the form of day nurseries to help mothers of young children, or in the provision of health and welfare facilities at or near the work-place. The

equipping of a surgery at the English Electric Company in 1943 was a response to the fact that workers at this Midlands factory found it difficult to get dental treatment (Thomas 1961). As the company was involved in priority war work, many additional people came in to work from nearby towns and villages. A number of them were too exhausted after working long hours to go elsewhere for dental treatment. In addition, the town's population was enlarged by evacuees from two south coast towns. The town's general dental practitioners could not cope with the many required extractions. The chairman and managing director, Sir George [later Lord] Nelson, gave instructions for the establishment of an industrial dental clinic. Others followed at all the major works of that company. By 1961, there were nine full-time dentists with their own clinics: two in Stafford, Preston and Liverpool; one each at Rugby, Bradford and Chelmsford (Marconi).

PART 7: THE POST-WAR PERIOD

Introduction

Establishment of the National Health Service in 1948 introduced a new situation. From then on, everyone in the United Kingdom had a right to free dental care.. This right ended the original reason for establishment of industrial services. However, it provided for employers an additional source of funding, making industrial dentistry even more attractive for some firms. Apart from anything else, it continued to mean that workers did not have to miss too much time away from work (i.e. there was no travel time). In many cases the dentist practised under his own name but assigned his fees from the NHS to the company. In return, it paid him a salary (Fever 1988, p 41).

Walls ice cream factory

The surgery was opened in 1968 at Wall's Gloucester headquarters (Anon. 1968). The dental facility was available to all staff, where they were advised on any necessary care. Treatment could then be obtained from the family dentist or at the unit.

PART 8: INDUSTRIAL DENTISTRY AND THE BRITISH DENTAL ASSOCIATION

Introduction

As the establishment of industrial clinics increased, the British Dental Association (BDA) began to take an interest. In a discussion of Nichols' 1921 paper about the Wills' scheme, Robert Lindsay, Dental Secretary of the BDA, said that when the Association was meeting at Bournemouth in 1920, much was said about public dental services (Nichols 1921, p.805). It followed a paper on Cadbury's dental clinic. Since Bournemouth, Lindsay had collected information from around the country on industrial dental clinics established by the owners of large factories for the benefit of their employees. He said that although such clinics might have started for philanthropic reasons, in most cases they had become a 'paying institution'. The proprietors of industries, he said,

> found it was worthwhile to establish clinics, and they got their reward in the better dental health of their work people, which resulted in more regular attendance and better work.

In June 1919, the BDA noted that the *Dental Summary* had examined the value of dental clinics in relation to industrial efficiency (BDA News and Comments 1919a). It suggested that articles in *Dental Summary* by Carl E. Smith, H. M. Brewer, E. L. Pettibone and R. W. Elliott strongly endorsed the value of clinics attached to large firms. Both employees and employers gained from the improved health, with consequent greater efficiency and regularity: it was thus a good 'business proposition'. The BDA stated that although this advantage had been proved over and over again, there still remained large employers of labour who failed to realise the truth. The BDA went on:

> Unless they do wake up to it, we, as a nation, shall find ourselves worse handicapped than ever in the race for industrial supremacy.

The BDA was delighted that the lay press was beginning to take up in earnest the question of dental health in relation to the general health and efficiency of the workers It indicated that on 12 July 1919, a very readable article in *The Times* on 'unprofitable labour' had suggested that the writer elaborately insisted on all the points enunciated above (BDA News and Comments 1919b). It went on, *The Times* reaches

> just those people who need to be educated in this matter, and it may be hoped that, for the good of the country, its missionary efforts may meet with the success they deserve.

On 1 August 1922, the chairman of the National Dental Service Committee (B. J. Wood) submitted to the Association's Representative Board the committee's report on industrial dental services (BDA 1922). It indicated (BDA 1922, p. 925) that the need for welfare work in connection with industrial firms had become recognised during the past decade. In particular, it had come to the fore during World War I, when so many soldiers were found to be dentally un-fit. The committee had found (p. 928) that dental schemes were operated by Cadbury Brothers, William Crawford and Sons, W. and R. Jacob and Company, Johnson Brothers, Moreland and Impey, Peek Frean and Company, Reckitts and Sons, Rowntree and Company, Hudson Scott and Sons, Tootal Broadhurst T. Lee Company and W. D. and H. O. Wills.

The committee pointed out that the efficiency of complicated organizations such as a large factory was very dependent on the health of every unit in the organization. The report stated (p. 926):

> The care bestowed by all enlightened employers of labour on the welfare side of factory organization is evidence that they are fully alive to the truth of this.

Nevertheless, it felt that the importance of dentistry in the preservation of health had not been fully realised. With a few notable exceptions, no provision had been made for dental treatment in spite of the widespread incidence of dental disease.

Although it was known that such disease led to pain and loss of teeth, these primary results paled into insignificance beside some of the secondary findings. In 1919, the chief medical officer to the Board of Education summarized these results as follows (Chief Medical Officer 1919, para. 114):

> (a) inflammation, pyorrhoea, and ulceration of the gum leading to disease conditions of the mouth and to glandular infection; many medical and dental authorities hold that even tuberculous infection may be established in this way;
> (b) general malaise, tiredness, lassitude, loss of weight, debility, enlarged glands - in fact, a toxic neurasthenia;
> (c) a group of microbic intoxications, which in some cases lead to joint affection simulating rheumatism in its symptoms and in later periods of life myocardiac and arterial degeneration;
> (d) various forms of anaemia (especially in women);
> (e) a group of somewhat remote results of dental disease, which leave their mark on the skin (acne, urticaria, eczema, & c.) affect the eyes (recurring iritis), ears or throat and dispose to nervous diseases;

> (f) a group of elementary toxaemia or gastro-intestinal conditions traceable to continued dental sepsis, resulting in ulcer, appendicitis and chronic constipation.
> Further, it must not be forgotten that many cases of adolescence and adult malnutrition or dispepsia are due to loss or decay of teeth in childhood.

Although some of these 'facts' may be challenged today, the case was very powerful coming from the Board of Education's chief medical officer, and would have been used around the country. As the committee pointed out, about 90 per cent of the population at that time were affected to some extent by dental disease. It is thus not surprising that the 1919 Departmental Committee on the Dentists Act (Acland Report 1919) strongly recommended:

> Steps should be taken without delay to recognise Dentistry as one of the chief, if not the chief means for preventing ill-health, and every possible means should be employed for enlightening the public as to the needs for conservative treatment of diseased teeth. The dental profession should be regarded as one of the outposts of preventive medicine.

The BDA report suggested (BDA 1922, p. 926) that the provision of adequate dental treatment for 'the masses' was one of the most urgent needs of the time; and the organisation of industrial clinics offered an excellent means of satisfying that need. Replies received by the Association from the firms listed above, showed from their experiences that:

- the provision of such treatment was appreciated by their employees
- the health of their employees improved
- the efficiency of the whole organization had benefited
- there was a considerable saving of time which otherwise would have been lost through absence from work in seeking relief from pain.

The BDA pointed out that in factories where foodstuffs were manufactured or processed, the cleanliness of the mouths and teeth of the workers was of equal importance to their general cleanliness and that of the factory. Indeed:

> The existence of dental disease in any form amongst the workers involves a serious risk of contamination of the product.

It is thus interesting that most of the dental schemes reported to the BDA in 1922 were related to manufacturers of foodstuffs.

Arrangements for treatment

The BDA found from its enquiries that the provisions made fell broadly into four groups:

a) arrangements with a local dentist to undertake work at a special rate of fees paid by the firm, which recovered the cost from the employees by small weekly instalments. In some cases the work was done at the dentist's practice, in others at a specially provided surgery in the works. However, all examinations were carried out at the works and the dentist was paid a retaining fee by the firm to cover the cost
b) an arrangement with a local dental hospital to undertake the necessary treatment, the firm giving "a substantial annual subscription" to the hospital and paying the tram fares of employees to and from the hospital.
c) Part-time dentists employed by the firm paid either a salary, fees or a combination of both. The treatment was carried out in surgeries at the factory. The part of the fee paid by the employees was collected by the firm who paid the dentist direct. Prosthetic mechanical work was usually carried out in the dentist's own workroom. Again, the employees paid off the amount in weekly instalments to the firm, who paid the dentist. One firm bore half the cost of denture work for those employees who had worked for it for at least three years.
d) whole-time dentists employed by the firm, paid wholly by salary.

In addition, a workroom with one or more mechanics was attached to the clinic at the works, usually forming part of the welfare department.

Conservative treatment was mostly free, a 'nominal fee' sometimes being charged for the administration of nitrous oxide or provision of gold fillings. In one case there was a fee of 6d for a local anaesthetic injection. Whenever fees were charged, the tendency was to encourage fillings rather than extractions by making charges for the latter but not for the former. Prosthetic care was provided at greatly reduced fees, which represented approximately the cost to the firm of the labour and materials for the purely mechanical part of the work.

In general, all employees were eligible for treatment. In one case, no employee with less than 12 months service was included. In another, the clinic was an integral part of a continuation school for employees under 18 years of age: although attendance was voluntary, every eligible employee had applied for admission. Again, dental inspection was not compulsory, but facilities were increasingly taken advantage of. The scheme as a whole (p. 928):

> is of the greatest interest as an example:
> (a) of one method of bridging the gap between the ordinary school leaving age and gaining eligibility for Insurance benefits in the ordinary course, and
> (b) of the kind of provision that will be necessary when the provisions of Section 10 of the Education Act of 1918 are brought into force.

The BDA committee was encouraged to note that whilst dental inspection and treatment were generally optional, four of the eleven firms replying to its questionnaire realised the importance of mouth hygiene in relation to general health. They thus made it a condition of the employment for all young people that they or their parents agreed for them to have all necessary dental work carried out by the works' dentist. In one case, authorization covered the whole period of employment up to the age of 21 years: in this case there was a regular system of annual inspections similar to that in school dental clinics. Whilst the committee doubted whether at that time a system of regular re-inspections of *all* employees was possible or desirable, it had no doubt of its need for younger employees. Its questionnaires showed that such a system was readily accepted by employees and their parents.

The committee pointed out that as dental caries is predominantly a disease of childhood and adolescence, systematic treatment would have safeguarded individuals from its subsequent ravages, with a consequent rise in the general standard of health. Its report suggested that where a local school clinic had been established for some years, the annual inspection of all young entrants to a factory would be a relatively simple follow-on from school care. In such cases, the amount of treatment necessary to maintain mouths in a reasonable state would be

> trifling in comparison with that necessary in dealing with young entrants who have had no previous treatment.

The committee strongly recommended that where there was a clinic attached to the factory it should be a condition of employment of young people that the works dentist should be authorised to carry out any necessary treatment to make them dentally fit and that this recommendation

> should in every case be regarded as the most important of the dentist's duties.

This suggestion was interesting. It meant that the committee wanted to consider the needs of patients rather than worrying too much about competition for other dentists who worked nearby; a good aim for any health conscious profession. On the other hand, where there was no factory clinic, it suggested that the employers should ask a local dental practitioner to visit the factory to inspect young applicants for employment, treatment being carried out at his own surgery. The report noted that all the firms supplying information made no reduction from the employees' wages for time spent on dental treatment, although in some cases piece-workers lost money.

Health promotion

Responses to the BDA questionnaire indicated that some factories made provision for the dissemination of information about care of the mouth and teeth. It was achieved by:

- lectures and talks by the dentist, nurse or welfare worker
- suitable paragraphs in the works magazine
- placards displayed in the waiting rooms and welfare departments
- distribution of leaflets on the care of teeth
- the printing of similar instructions on the back of 'contribution' and appointment cards.

In addition, toothbrushes, powders or pastes were provided for employees at cost price. As dental disease is largely preventable the BDA emphasised that this propaganda work should be an indispensable adjunct to any properly organized factory clinic. With perseverance, a reduction of dental disease would follow.

The *Report of the National Dental Service Committee on Industrial Dental Service* was adopted unanimously by the BDA's Representative Board (BDA Notes 1922). It was decided to print and circulate the report in the hope of developing the concept. As the BDA pointed out:

> It will be read with interest who really believe in dental health as a pre-eminently important factor in industrial life; and it cannot but add to the reputation of the Association as the authority to whom social reformers may confidently look for sound advice in the practical application of dentistry to the problem of national hygiene.

The association suggested that this report should receive careful study from its membership as it certainly would gain attention from a wider circle of readers when issued in pamphlet form (BDA Notes 1922a, p 917). It thanked the

chairman and his committee for their hard work. The BDA emphasized the importance of that committee. In the preceding two years it had presented reports to the Representative Board on: dental treatment and national health; suggestions for the standardization and coordination of public dental services; the duties and training of the dental nurse; suggestions for the institution of a Diploma in Public Dentistry; a report on the school dental service; and a report on industrial clinics. In addition, it had dealt with dental treatment as an additional benefit under the National Health Insurance Act of 1911 and had arranged conditions of service under a scale of fees suitable to this partial, temporary and unofficial experiment in such service; the conditions of service and scale of fees for dental work under the Ministry of Pensions and other bodies. Indeed, so valuable did the writer of the Notes feel the reports to be, that it was suggested the time was ripe for the collection, arrangement and publication of their various reports giving in one volume the opinion of the British Dental Association on the whole question of public dental service.

The *BDJ* was gratified that so many large manufacturers realised the importance of dental service as a part of their welfare work, and had found it was not the

> expensive and luxurious fad which superficial consideration might designate it.

Rather, it was a business proposition giving due return for the money spent: greater happiness and comfort for the firm's workers, increased efficiency, saving of factory time, and an appreciable reduction in sickness and ill health (BDA Notes 1922b, p. 918). It hoped that the report would stimulate other firms to establish dental clinics. Pertinent for 1922, it concluded by asking a question which had previously been asked but to which no answer had been forthcoming:

> What is that largest employer of labour - the British government - doing for the dental needs of its employees?

As we now know, it took until July 1948 before there was a major thrust towards dental care for the whole population: when the National Health Service was established.

> The firm employs three whole-time fully qualified dentists, together with two mechanics and four attendants.

So stated a booklet, *Health in the factory*, which was noted in a *BDJ* editorial (1922). The editorial said it was an encouraging sign of the times, highlighting the steadily gaining ground of health care in the industrial world. The concept of health and welfare services at work had been given a large impetus by the need for physically healthy workers during World War I. That impetus dwindled after the war and proved to be a negligible factor in the promotion of better health. However, by the early 1920s, the interest was again growing. The editorial pointed out:

> The condition of the teeth of the wage earners of this country is appalling.

However, it indicated that the only ones who can realise the amount of suffering from dental causes were those people whose medical or social work brought them into contact with

> the personal life of the people.

Some of the editorial's remarks would be very pertinent in relation to today's dental undergraduates. It indicated that every student was, to some extent, made aware of the prevalence of dental disease by the hospital work he had to carry out. However, unless after qualification he serves some public institution, he was apt

> to become oblivious of the immense range of dental disease and of its ravages among those classes who are least able to bear them, and least able to get them remedied.

In the past, social workers, medical officers examining recruits and dentists holding a hospital appointment had been the only ones fully able to appreciate the extent of dental disease and the physical disability arising from it. Two other sets of people had recently begun to take account of the problem and its bearing upon the nation's health: officials of the Provident Societies whose business it was to look into the causes which led to expenditure of their funds were rapidly awakening to the situation; and 'intelligent employers of labour', who were beginning to follow the examples of enlightened firms such as those of Cadbury, Reckitt or Rowntree in taking practical steps for the treatment of dental disease to the advantage of themselves and their workers. The *BDJ* editorial (1922, p. 958) claimed that ever since Robert Owen showed that provision for the happiness and

well being of the individual worker was not inconsistent with the success of industrial enterprise – indeed it was essential - employers had been found in whom a humane regard for the comfort of their employees had combined with the legitimate pursuit of their own interests to bring about progressive improvements in their employees' environment.

The editorial had no doubt that public opinion still allowed some employers to exploit the sweated labour of their work people, regarding them as

> nothing but many cogs in the machinery which is used to grind out for him his fortune.

As it pointed out, this disregard of human beings really worked against their own interests. They did not realise that when treated as human beings their workers would respond

> as no mere cog or tool can ever do.

On the other hand, employers who treat their work people as human beings find that their output is larger and better.

Realising that it was true for their general health and well-being, some employers began to recognize also the value of provision for the care of their workers' teeth: that dental disease must be properly dealt with if factory life was to be protected from

> that long train of ills which so seriously interferes with efficient service – such as irregularity and uncertainty of attendance, general enfeeblement of working power, the sapping of vitality owing to the oft-repeated attacks of pain, or owing to the more insidious and deadly forms of trouble from septic poisons.

The *BDJ* editorial said that it had been abundantly proved that run purely as a business proposition, a dental clinic offers

> remarkable returns in efficiency, as well as in actual annual turnover.

Thus, it was a question of hard cash as much as humanitarian consideration.

Looking to the future, the editorial suggested that the day might come when all workers would be in receipt of dental benefits under a National Insurance Scheme. There then would be no need of 'works clinics'. Indeed the time might also come when the dental treatment of children and adolescents is so

complete that no one will be obliged to start work handicapped by dental disease and its sequelae. Although intensely wanted, they were to be much in the future. Thus, there was no doubt in the writer's mind that large industrial firms would find it advantageous to provide some form of dental care. As to what type of care, that would vary with the circumstances. The editorial suggested that the National Dental Services Committee report should be read by all.

The editorial was sure that many BDA members were interested in dentistry as

> something more than a private professional occupation.

They would want to play their part in improving the lot of the workers and in promoting a higher standard of health for them. To such people it recommended study of the report and *Health and the factory,* which could be obtained from the Bournville Works. Indeed, some of them might be attracted to such an appointment as dental surgeon to

> a firm of repute, engaged in one of the many productive or distributive trades that make, or should make, the world - if the times were not so out of joint - hum like a busy hive.

Amongst the advantages put forward by the *BDJ* were that the dentist would have an assured position; freedom from business anxieties; an opportunity for observation and research; and a feeling of "helping to run smoothly and efficiently a complicated piece of machinery such as is any great industrial concern", which helps to make

> the great wheel of commerce revolve in ordered harmony. [p 960]

It said that for anyone interested in 'social betterment', the Report indicates one way of strengthening the foundations of national health. The *BDJ* said that the report should provide much satisfaction to every member of the BDA. It should also be taken as further proof that the association was the acknowledged authority on anything connected with the practice of dentistry.

By 1945, the British Dental Association was taking the subject of industrial dentistry seriously. That year saw the inaugural meeting of the Industrial Dental Officers Division of the BDA. It was addressed by Sir Alfred [later Lord] Webb-Johnson, President of the Royal College of Surgeons of England. He told the

audience of his admiration for what many firms had done to develop health services in their businesses and factories. Webb-Johnson (1945) said he had been particularly interested in developments at the Cunliffe-Owen Aircraft Factorys 'since Mr Thomas Raby took charge of their dental clinic'. He went on:

> It is impossible to exaggerate the importance of adequate dental services for the nation. There is no single factor which plays a greater part in preserving the health of the people than care of the mouth and teeth, and it is to be hoped that the provision of adequate dental care will be in the forefront of the organisation of a National Health Service.

Webb-Johnson said that in order to eventually provide adequate dental care for the 'whole of the nation, gradual development would be unavoidable. However, that development could be speeded up by careful organisation, which had been clearly demonstrated by some large industrial concerns. He pointed out the relatively ease of arranging health services in large factories and businesses. Webb-Johnson told of the

> great opportunity, particularly of dealing with adolescents, who have been under supervision during their time at school.

Attention at that time would save them from serious dental problems later in life.

Webb-Johnson reminded his audience of the potential for preventive medicine and dentistry Also, of the value of regular oral examinations, which could detect possible serious disease elsewhere.

Finally, Webb-Johnson welcomed formation of the new division as he was a firm believer in specialisation. He recognised that the BDA committee would consist of

> experts in the factory field of work.

They would be in a position to advise employers in relation to dental schemes. The division should be well placed to work with management and medical officers to raise the standards of oral health and, in so doing, it would also benefit the British Dental Assication itself, by keeping it in touch with growing developments.

Finally, Webb-Johnson emphasised that the division would only achieve its aims

> if they insist on proper conditions of service for those involved in the practice of dentistry in this way.

If there was not adequate remuneration, then recruitment would suffer.

PART 9: SOME LATER DEVELOPMENTS

Although important, the British Dental Association was not the only key player. Prior to 1949, when the main organisations amalgamated into a single unified BDA, there were a number of separate organisations. The Public Dental Services Association was formed jointly in 1922 by members of the British Dental Association and the Incorporated Dental Society, because the BDA would not admit non-qualified practitioners as members. It was essential at that time for qualified and non-qualified dentists to speak with one voice in dealings with the Government and approved societies. Otherwise, each would be played off against the other in negotiations about fees for dental care provided under the NHI scheme. In the early 1940s, the BDA began to receive an increased number of enquiries for advice and co-operation on the establishment of industrial dental services (Ballard, 1944). These enquiries were not merely manifestations of a newly-quickened interest in industrial health resulting from official and unofficial war-time investigations and regulations. They were indicative of a heightened appreciation of the relationship of dental disease to general problems and the sense of a new opportunity.

In 1944, Fred Ballard, a leading (unqualified *Dentist-1921*) member of the PDSA, referred back (Ballard 1944, p, 504) to the 1922 BDA report which stressed to employers of labour and large manufacturing organizations the evil effects of dental disease upon industrial efficiency. The BDA had urged employers to make arrangements to meet their needs through local dentists or by part-time appointments to the factories, or by establishing dental clinics within the works with full-time dental officers.

In 1937, certain modifications in policy were introduced in view of the general improvements in facilities for dental service throughout the country. The BDA was moved chiefly by the following conditions:

- the undesirability of placing the ultimate control of the dental treatment of employees in the hands of their employers
- the urge towards the establishment of dental benefit on a statutory basis
- the safeguarding of free choice of dentist

- the comparison with factory medical service which was limited to inspections and emergency treatments.

The Association's recommendations were:

(a) against industrial dental treatment centres except for emergencies and regular inspections.

(b) the issue of certificates of dental fitness by a works dentist or the employee's own dentist

(c) the institution of schemes to assist payment of the cost of treatment by regular deductions from wages, and by granting leave of absence for dental treatment when necessary.

The arguments used to influence employers were again the imminence of full statutory dental benefit to include juveniles of pre-insurance age, and the importance of the school dental service as a priority requirement in promoting national industrial efficiency and well-being.

Ballard (1944) wrote that as in World War I, in 1939, official departments were required to pay special attention to industrial health. The work of the welfare and health departments of the Ministry of Munitions of the First World War had been enormously expanded in this purpose. Between the wars there had been a progressive expansion of public interest and the influence of departments and industrial agencies on the subject.

The medical officers of the Factory Departments of the Home Office and the Ministry of Labour and National Service had given increasing attention to industrial diseases and to the promotion of healthier conditions in industry. The work of the Industrial Health Research Board, the successor to the Industrial Fatigue Research Board of 1917 and of the Industrial Health Advisory Committee, had been very important. At the beginning of the war, in 1939, it was recognised that many people unused to industrial life would enter into factory conditions which were bound to affect adversely their general health, and workers used to ordinary factory conditions would be put under great strain in less favourable conditions.

Of necessity there had been a great deal of consultation between government departments and administrative, scientific, medical and industrial experts. There was ready co-operation between ministries. For example, Health, Labour, Supply and Fuel and Power were all interested in the problems of dermatitis in industry.

In 1940, the Factories (Medical and Welfare Services) Order gave power to the Chief Inspector of Factories to require the occupiers of factories producing munitions to appoint whole time or part time medical officers where he considered them necessary. The British Medical Association appointed an Industrial Health Committee. It recommended in 1941 that the relationship between industry, health and disease should be given prominence in medical school curricula.

Ballard (1944, p. 504) pointed out that there were several government publications for the guidance of people considering the institution of medical services. He went on:

> One day perhaps, we may know more of the very good work that has been done by the dental officers of the Ministry of Health, as part of the extensive investigations and operations that have been undertaken.

Ballard continued:

> It is certain that they have helped effectively to extend and develop the view of the importance of dental service amongst both medical officers and management, and the enlightened view of the scientific medical officer on the subject results largely from Whitehall.

He also mentioned that some of their investigations were relevant to the work of dental mechanics; for example, on the processing of acrylic resins and polishing materials. However, the Home Office medical officers established that there was no special danger to workers from methacrylate.

Ballard (1944, p. 505) said that in 1944 there appeared to be no justification for the limited advances in service envisaged in a statutory dental benefit. Sir William Beveridge's 1942 report (Beveridge 1942) and the Government's White Paper on the National Health Service had broadened the conception of dental service infinitely. Ballard said:

> The narrow view that relates dental service in factories to industrial efficiency, important as it is ... has become humanised by an awareness that a human being is not just an instrument of production.

He went on:

> It is seventeen years since the proposal to set up an experimental clinic within the dental benefit scheme nearly frightened the profession out of its wits.

Ballard said he had recently reviewed the controversy that raged around that proposal. Some of the arguments were:

> The present system is in great favour amongst the insured public because it enables the insured member of the family to receive treatment by the regular family dentist;
> that the distribution of dentists in Great Britain is such as to secure the best possible means of giving an efficient and adequate service;
> that the institution of clinics would be detrimental to the insured member particularly;
> it is a well known fact that the majority of insured persons are entirely against institutional treatment.

Ballard felt that, in 1944, the idea was no longer regarded as being so sinister. It was felt increasingly by the profession that the great need of conservative dentistry and the challenge of the idea of prevention would tax all available resources. He said that some of the early entrants into the field of industrial dentistry were badly advised and created resentment in the profession quite unnecessarily. Nevertheless, he felt that the concept was perfectly sound in principle. He was therefore asking aloud what guidance could be given to enquiries on the dental aspects of any industrial medical service.

Under the Factories Act of 1937, juveniles under sixteen had to be examined before entry into industry, and a certificate given that they were fit for the work on which they were to be engaged (Ballard 1944, p. 507). It appeared that these examinations generally had little regard to the condition of the teeth. There were firms who required a clean bill of dental health for adolescent entrants to the organization. However, a firm could not require this without providing the means of maintaining it.

Ballard's thoughts were published in August 1944 in the *Dental Gazette*, official organ of the Public Dental Service Association. In the same issue there was an editorial on the subject It pointed out that the dental profession had many problems to face at that time: one, as yet little considered, was that of dental care in industry - a subject mentioned in the White Paper on a comprehensive health service, but which was to be excluded from the general programme and

> presumably left in the hands of the Home Office.

The editorial suggested that among the many causes of absenteeism in industry, pain and other local dental conditions take a high place. However. the more

general manifestations of oral sepsis of a remote cause of ill health must be borne in mind. It went on:

> Great industrialists are not entirely philanthropic, but usually they are willing to spend money on the general well-being of their employees once they are convinced of the fact that their staff are better in health and happier in their work as a consequence.

The editorial (1944, p 502) pointed out there were certain industries where dental fitness on entering the industry, and 'continuous day to day' care were essential:

(i) because the industry is classed as dangerous – e.g. work with phosphorous, lead and chromium
(ii) where personal cleanliness is essential – e.g. persons engaged in the preparation and packaging of food
(iii) because there is unusual risk to the teeth in the nature of the industry - e.g. factories making chocolates or sweets; bread and confectionery making and selling; milling of flour and so on.

PART 10: ASSOCIATIONS OF INDUSTRIAL DENTAL SURGEONS

Throughout time it has been common for like-minded people to gather together to exchange knowledge, ideas and viewpoints. Thus, the American Association of Industrial Dentists was founded in 1943 (American Dental Association 1980, p. 945):

> to unite into one organization members of the dental profession and other persons or groups engaged or interested in industrial health, for the purposes of sponsoring the study and discussion of oral health as related to industrial health, productivity and safety; standardizing methods for the conservation or improvement of oral health among persons in industries; initiating preventive industrial dental procedures; promoting a more general understanding of the purposes and results of dental health care of persons in industry; and encouraging the development of new industrial oral health programs and promoting mutual understanding with other categories of industrial hygiene personnel.

By 1947, about 200 dentists in America were employed in industrial settings. However, by 1960, the AAID was dissolved because of a lack of members.

It was in 1962 that the United Kingdom Association of Industrial Dental Surgeons was established (Editorial 1962). Dentists working in industry felt a

need to establish a special group separate from the British Dental Association. The new association provided an opportunity for industrial dentists to share information and to promote their ideas. Its aim was to promote dental care at the workplace by non-political, scientific means. The stated objectives were:

- to unite into one organization members of the dental profession who are engaged full- or part-time in the practice of Industrial Dentistry
- to further the study, discussion and improvement of dental health as related to industrial health
- to further a more general understanding of the needs and advantages of oral health care of persons in industry
- to further mutual understanding with other groups engaged in the study or practice of industrial health and hygiene
- to consider any other problems arising from or associated with the practice of dentistry within industry.

With time, the A.I.D.S. spread its wings. By 1999, it had 170 members representing 28 employers world-wide. Eighty two members were dental surgeons, the remainder being dental auxiliaries employed in industry. Appendix B lists firms known currently to have a dental service of some kind.

EPILOGUE

Roberts (1944) reminds us that, in addition to the general widespread dental ill-health which also affects industrial workers, there are also some industries with specific industry-based diseases; e.g. tooth erosion in car battery workers. It is essential that workers in such industries continue to have regular check-ups and appropriate care.

As will have been seen, many industrial schemes have developed over the years. Some have changed dramatically whilst others have faded away. It will be interesting to look back at the end of the next century, to see how they have fared, both in the United Kingdom and in other countries

Clearly, there is a great deal more to be written on this subject. However, it is hoped that readers will have been sufficiently stimulated by this monograph to realise the importance of industrial dental care in the days long before there was a Health and Safety at Work Act, or a National Health Service which provides dental care for *the masses*.

ACKNOWLEDGEMENTS

Sincere thanks are due to the Librarians at the British Dental Association, the Royal Society of Medicine and the Wellcome Institute for the History of Medicine for their help in locating material. Also, H. McK. Cherrett, Director of the Department of International Dental Health of the American Dental Association and Ms. Cathy Hughes-Hallett, Honorary Secretary of the Association of Industrial Dental Surgeons, both of whom provided helpful information.

Appendix A:

Some early UK dental organisations which established dental clinics

1887	The Great Western Railway Medical Fund Society
	Bryant & May
1904	Rowntree of York
1905	Cadbury of Bournville
	J. S. Fry of Bristol
1905	Peek Frean and Company
1909	Reckitt and Sons of Hull
1909	Crawford's of Liverpool
1912	W. D. and H. O. Wills of Bristol
1923	Mather and Platt of Manchester
1925	London General Omnibus Company
1926	Chloride Electrical Storage Company of Manchester
	Lever Brothers of Port Sunlight
	Gimson Shoe Machine Company of Leicester
1930	Selfridges
1931	R. A. Lister and Company of Gloucestershire
1934	Marks and Spencer
1943	English Electric Group of Companies
1946	Octel
1947	Unilever
1950	CMP
1957	British Airways
1968	Walls Ice Cream

Appendix B:

Large industrial concerns with dental services in 1927 (based on information supplied to W. H. Shipway)

Angus Watson, Sardine Manufacturers, Newcastle-on-Tyne
Associated Octel
ASS WallPaper Manufacturers, London
Austin Motor Co., Birmingham
Bibby & Sons, Soap Manufacturers, Liverpool
Burnley & Co., Woolcombers, Bradford, Yorks
Cadbury Bros., Chocolate Manufacturers, Birmingham
Chillington Tool Co., Engineers, Wolverhampton
Chloride Electric Storage Co., Electrical Equipment Makers, Manchester
D & W Gibbs, Soap Manufacturers, London
Fullers, Chocolate Manufacturers, London
Gimson Shoe Machinery Co., Leicester
Johnson Bros., Dyers, Liverpool
J S Fry & Sons., Chocolate Manufacturers, Bristol and Montreal
Lever Bros, Soap Manufacturers, Port Sunlight
London General Omnibus Co.
Mather & Platt, Engineers, Manchester
Maunder Bros., Paint Makers, Wolverhampton
Morland & Impey, Stationery Manufacturers, Birmingham
Peak Frean & Co., Biscuit Manufacturers, London
Quest International
Reckitt & Sons, Blue, Blacklead and Metal Polish Manufacturers, Hull
Rowntree & Co Ltd., Chocolate Manufacturers, York
Scholfields, Milliners, Leeds
William Crawford & Sons, Biscuit Manufacturers, Liverpool
J Lyons & Co Ltd., Chocolate Manufacturers and Restaurateurs, London.

Appendix C:

Companies currently employing/associated with dentists who provide an industrial type of service

AEA Harwell
Albright and Wilson
ARAMCO
Associated Octel Company
Bahrain Petroleum Company
Bank of England
Bank of England Printing Works
Beecham Group
Bentalls
British Aircraft Corporation
British Airways
British Broadcasting Corporation
British Insulated Callenders Cables
British Leyland
British Nuclear Fuels
British Petroleum
British-American Tobacco
Bush, Boake and Allen
Butterfield and Slater
Cadbury
Carborundum
Carreras
Central Electricity Generating Board
Chloride Automotive Batteries
Colgate-Palmolive,
Corporation of London
Courtaulds
Delta Enfield Metals
English Calico
General Electric
Glaxo Wellcome (UK)
Guest, Keen & Nettlefolds
Hardy-Spicer
Imperial Chemical Industries
Imperial Metal Industries
International Aeroradio
J Lyons

John Player & Sons Rank Organisation
Marks and Spencer
Mobil Oil
Oxford Hospitals
Pilkington Brothers
PPF International, Ashford
Quest
Reed International
Rothmans of Pall Mall (Int)
Rover Group
Rowntree Mackintosh
Selfridges
Shell International Petroleum
Shell UK
Tate & Lyle
Unilever
United Africa Corporation
United Biscuits
W. D. and H. O. Wills

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