

Dental standards: fifty years of development

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IN BRIEF

- Stresses how dental standards ensure quality and safety for dental care.
- Highlights the significant role the United Kingdom has played during the fifty years of dental standards development.
- Questions how international standards make sense in today's global environment.

Dental standards play a vital and important role in society by contributing to the quality and safety levels of products used in dental treatments by dental professionals as well as the hygiene products used by the general public. Few members of the public or indeed many dentists fully appreciate the contribution made by ISO international dental standards to the safety and quality of dental care. Further more the United Kingdom played a significant role in the establishment of the international standards organisation (ISO). The first two meetings of the dental international standards committee took place in England. In this article Derek W. Jones outlines the significant and important role played by the UK during the fifty years of dental international standards.

It is perhaps not surprising that the committee devoted to developing international dental standardisation first commenced its activities in England. After all the Magna Carta, perhaps the best-known document in English history, provides an example of standardisation. King John of England signed the Magna Carta on 15 June 1215 on the Island of Runnymede on the River Thames. The Magna Carta document specified, 'There shall be one measure of wine throughout our Kingdom and one of ale, and one measure of corn, to wit, the London quarter, and one breadth of dyed cloth, russets, and haberjects, to wit, two ells within the selvedges. And as with measures so shall it be also with weights.' Thus standards for the consumer were clearly established in England almost 800 years ago. It was therefore very appropriate that the first meetings dealing with international standards for dentistry were also held in England following the establishment of ISO/TC 106 fifty years ago in 1962.

ESTABLISHING THE ISO

In 1946 the first ever Commonwealth Standards Conference, was held in London organised by the British Standards Institution (BSI). This conference led to the establishment of the International Organisation for Standardisation (ISO), thus the British were instrumental in establishing international standards. Although the ISO organisation was created in 1946, the ISO Dental Committee ISO/TC 106 was not established until 16 years later in 1962 and held its very first meeting the following year in October 1963 in Manchester England; the acting chair was Professor Ernest Mathews. The second meeting was held in London in July 1966 with acting chair Mr G. Weston. In July 1967 the third meeting was held in Paris with Dr John W. McLean as chair. John was appointed as the first official chair of the committee. Dr. John McLean was to serve as chair of the dental standards committee for a record period of fifteen years, during which time he established the great spirit of collaboration and consensus under which the committee continues to operate. The BSI having been assigned the secretariat of this important committee, with Dr Alan Atkinson as the secretary, was to continue this role for the next 42 years. To say that the UK has a strong history in the area of dental international standards, which continues to this day, would be a major understatement.

In 2004 the secretariat of ISO/TC 106 was transferred to the Standards Council Canada (SCC), and is administered by the Canadian Dental Association. The ISO/TC 106 committee was set up with a mandate to continue the work of the International Dental Federation (FDI) who had produced the first nine international dental standards between 1953 and 1958. The FDI has continued to collaborate with ISO/TC 106 in the development of several clinical standards since 1962.

The very first dental (national) standard was developed 86 years ago by the US National Bureau of Standards; this was a standard for dental amalgam restorative materials. The materials, devices and equipment of today are superior to those that were available fifty years ago and the newer international standards are also superior to earlier versions. Compared to fifty years ago dentistry is now much larger in scope and more complex with a greater scientific base and a stronger emphasis on conservation of natural tissues. However, the need for international dental standards in 2012 is just as important as ever it was.

CHANGING TIMES

When ISO/TC 106 came into existence fifty years ago there were nine international standards in existence as stated above; these had been produced by the World Dental Federation (FDI). Much has been

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accomplished since that time. Currently a total of 47 countries are involved in the work of ISO/TC 106 (26 participating members and 21 observer members). Although ISO has three official languages (English, French and Russian) for the past twenty years or so the deliberations at the TC 106 committee meetings have been conducted in English even though the membership of ISO/TC 106 comprises some 26 different languages. The 47 meetings of the ISO/TC 106 committees have been hosted in 19 different countries since the first meeting in England in 1963. The three hundred or so international dental experts of ISO/TC 106 who meet annually are committed to developing globally relevant standards. Their harmonious, efficient and effective working relationship in this task is indeed a wonderful testament to the pioneering work of the late Dr John McLean the first chairman.

During the past fifty years many individuals from around the world, with their experience and knowledge, have generously devoted many hours in order to produce and revise dental standards. Amazingly during the first fifty years of the technical committee it has only had five official chairmen, the first two meetings being chaired by acting chairmen. The attendance at the annual meetings has increased by over 600% during the 50-year period. The committee has also seen a significant increase in the number of countries (member bodies) participating actively in developing dental standards. Some 17 years ago we saw a significant change in the workload of the committee; the central secretariat in Geneva delegated much more of the responsibility to the sub-committees. The central secretariat also made a change about ten years ago to more strictly limit the time that working groups and sub-committees could spend on the development of a standard. Another major change in the operation of the work program has taken place with the increasing use of the internet during the past twenty years, however, the face-to-face meetings of experts is still an extremely important and vital factor in arriving at consensus agreements of complex problems.

FAR-REACHING STANDARDS

In the past few years the aim has been wherever possible to develop 'horizontal



50th anniversary of ISO/TC 106 Dental Standards Committee; (left) Derek W. Jones fifth chair of ISO TC106 (2006-present), (right) John W. McLean first chair (1967-1981). Photograph taken 1976

standards': these are applicable to all classes of topics in a particular field while vertical standards apply to one particular class. For example, a standard devoted to dental definitions or vocabulary would be a horizontal standard. A vertical standard might apply to the performance and various components of a single type of dental cement such as zinc phosphate cement. Another vertical standard might apply to a single type of dental (drill) handpiece. A horizontal standard would apply to a range of different types of cements or to a range of different types of dental handpieces. The combining of several standards into one single document is desirable wherever possible and has indeed been achieved in a number of cases. In the last few years the focus for materials is on performance-based standards rather than prescriptive standards.

ISO/TC 106 now has a total of eight active sub committees and close to fifty working groups devoted to developing standards for biocompatibility, restorative materials, orthodontic materials and devices, instruments, equipment, oral hygiene products, implant devices and materials, computer aided design and computer aided manufacture (CAD/CAM) as well as the development of terminology and coding systems. In addition to Canada, which holds the ISO/TC 106 secretariat, a further four countries hold the secretariats of the eight sub committees: France, Germany, Japan and the United States.

It is estimated that some 99% of all adults in the world suffer from some form of dental disease or malfunction in the course of their lives. Thus the very high value and importance of dental standards is based upon the fact that most individuals require dental care at some stage in their lives. The ultimate consumer of dental products, either directly or indirectly is the general public. The total of 158 ISO/TC 106 dental standards also cover products supplied directly to consumers, for example oral hygiene products such as mouthwash, dentifrice and toothbrushes.

STANDARDS FOR MATERIALS AND INSTRUMENTS

It is also interesting to contemplate that artificial materials are used to replace the tissues of teeth more than any other part of the human body. Clearly materials selected for use as a replacement for natural dental tissues have a very high demand placed upon their chemical, physical and biological characteristics. These are the parameters that must be addressed in developing standards for these dental restorative materials. The varying pH in the mouth and the stresses of mastication has an aggressive affect on the integrity and wear of materials replacing natural tooth structure.

ISO standards have been developed for impression materials, investment materials, model-and-die materials, casting alloys, ceramics and cements. For a range

of dental restorative materials the setting time, strength, colour stability, biocompatibility, expansion and contraction are addressed in the standard specifications.

The standards for restorative materials specify various limits for physical and chemical properties. Radiopacity is a very important aid for dentists in diagnosing recurrent caries; this relies on the presence of radiopaque restorative materials. An improved standard for the determination of radiopacity of restorative materials is currently being developed. A standard has been produced dealing with implantable materials (resorbable or non-resorbable) for bone filling and augmentation in oral and maxillofacial surgery. A further standard deals with membrane materials for guided tissue regeneration in oral and maxillofacial surgery.

A whole range of standards have been developed for the complex variety of instruments and devices used by dental professionals as well as the range of equipment in the dental operator. For example an ISO standard specifies the limits for exposure to ultraviolet irradiance from dental operating lights; this of course protects both the dentist as well as the patient.

A VITAL ROLE IN SOCIETY

The dental technical committee has developed more than the 158 international dental standards that exist today; the number has been reduced over time as various standards have been combined into a single document. Dental standards are for the protection of the health and safety of the patient as well as the dental professional. Dental standards are developed in response to the consumer pressure for increasing quality of dental care. Standards are also developed due to the difficulty

often encountered by dentists in making meaningful comparisons between various products due to lack of information, this is achieved by standardised packaging and labelling information.

There is no doubt that dental standards play a vital and important role in society by contributing to the quality and safety levels of products used in dental treatments by dental professionals as well as the hygiene products used by the general public. ISO/TC 106 has been socially responsible by addressing the concern about the impact of dental mercury in the environment. The release of mercury from the dental office has been addressed by the publication of (ISO 11143) amalgam separators. The biocompatibility of medical devices used in dentistry (ISO 7405:2008) specifies test methods for the evaluation of biological effects of medical devices used for dentistry purposes. It includes testing of pharmacological agents that are an integral part of the device under test.

Standards have been developed for the general requirements of the dental stool, the dental operation unit, suction systems, compressor systems and the patient chair. A further standard deals with essential characteristics of test methods for the evaluation of treatment methods intended to improve or maintain the microbiological quality of dental unit procedural water. A standard specifies test methods for determining the resistance to chemical disinfectants of all materials used for external surfaces of dental equipment intended for such disinfection.

Above all it is very important to remember that international dental standards do make a very important, positive and significant contribution to the quality of oral health and the safety of dental care as well as stimulating the development of

improved products. International standards also aid the breaking down of trade barriers, thus making a larger range of quality dental products available to a larger segment of the population worldwide in developed as well as developing countries.

A million or so dental professionals worldwide each working day are using materials, devices, equipment and procedures covered by dental international standards. In addition there are billions of members of the general public who use over-the-counter dental hygiene products on a daily basis which are also covered by international dental standards. Clearly international standards make sense in today's global environment. The ISO dental committee has made a significant difference to the quality of dental treatment received by millions of people worldwide during the past fifty years. The dental committee is planning to commence work on a new project dealing with the development of a classification of both dental caries and types of prepared cavities in teeth. The progressive use of a more conservative approach and minimal intervention in modern dental practice necessitates this important initiative.

The British Standards Institution traces its history back to 1901; and 81 years ago a supplemental charter was granted to changing the name, to the British Standards Institution. Although the dental ISO committee was created fifty years ago, the meeting in 2012 being held in Paris is only the 48th meeting. The 50th meeting of ISO/TC 106 is due to take place in 2014; it would have been extremely appropriate to hold this special historic meeting in the birth place of dental international standards, England. Unfortunately this is not possible and the 50th meeting will be held in Berlin, Germany.