ADA initiates development of orthodontic informatics standards

William E. Harrell Jr,[a] Sharon Stanford,[b] and Paul Bralower[c]
Alexander City, Ala, and Chicago, Ill.

Standards are the key to interoperability across systems. The American Dental Association (ADA) has been accredited by the American National Standards Institute (ANSI) as a standards-developing organization. The ADA sponsors standards programs for all areas of dentistry, including dental materials and products and dental informatics. ANSI/ADA Specification No. 1000, Standard Clinical Data Architecture for the Structure and Content of an Electronic Health Record, is the first ANSI standard that defines the fundamental data structures used to make patient health records. The standard promotes the sharing of like data between dentists, physicians, and hospitals. (Am J Orthod Dentofacial Orthop 2005;128:153-6)

Standards are the key to interoperability. To facilitate rapidly growing digital imaging and communications applications, telecommunication carriers, service providers, and equipment manufacturers rely on standards to ensure reliable transmission and interoperability between equipment (Fig 1). The American Dental Association (ADA) has been accredited by the American National Standards Institute (ANSI) as a standards-developing organization. The ADA is the sponsor and secretariat of the standards program for all areas of dentistry, including all types of dental materials and products (ADA Standards Committee on Dental Products [ADA SCDP]) and dental informatics (ADA Standards Committee on Dental Informatics [ADA SCDI]). These committees comprise a balance of interests among dentists, government, academia, and industry and develop standards according to rigorous protocols that ensure consensus among all interested parties.

Overall, the ADA works to develop standards to enhance the safety and health of patients, foster better and consistent quality of dental products, and reduce costs of products for members.

The particular focus of the ADA SCDI is to "promote patient care and oral health through the application of information technology to dentistry's clinical and administrative operations; to develop standards, specifications, technical reports, and guidelines for components of computerized dental clinical workstations; electronic technologies used in dental practice; and interoperability standards for different software and hardware products which provide a seamless information exchange throughout all facets of health care."

To meet these objectives, the ADA SCDI has developed and published several dental informatics standards and technical reports, including ANSI/ADA Specification No. 1000—Standard Clinical Data Architecture for the Structure and Content of an Electronic Health Record. ANSI/ADA Specification No. 1000 is the first American national standard that defines the fundamental data structures used to make patient health records. The standard's inherent commonality promotes the sharing of like data from disparate systems. The Electronic Health Record spells out how information systems can be used to make patient records more analogous between dentists, physicians, and hospitals.

The ADA SCDI is currently launching an effort to extend ANSI/ADA Specification No. 1000—Standard Clinical Data Architecture for the Structure and Content of an Electronic Health Record (and its other dental informatics standards) to cover the requirements of orthodontics.

Although many dental informatics standards apply to orthodontics, many information elements specific to orthodontic treatment (diagnosis, treatment planning, treatment monitoring over time, outcomes analysis, appliances, root anatomy) and imaging (face, teeth and model scans and other geometric data, X-rays, photographs, cephalometric data, cone-beam computerized tomography, and yet-to-be developed technologies) might not currently be included. The new initiative's objective is to extend or modify the existing electronic health record architecture to include the structure, formats, and relationships of these additional informa-

[a]Private practice, Alexander City, Ala.
[b]Director, Standards Administration, American Dental Association, Chicago, Ill.
[c]Manager, Standards Administration, American Dental Association, Chicago, Ill.
Reprint requests to: Dr William E. Harrell, Jr, 125 Alison Dr, Suite 1-A, Medical Arts Bldg, Alexamder City, AL 35010; e-mail, drharrell@aol.com.
Submitted, January 2005; revised and accepted, April 2005.
0889-5406/$30.00

doi:10.1016/j.ajodo.2005.04.017

Fig 1. Standards are used to ensure that different components of technology communicate with each other; all components must be interoperable.

tion elements and the protocols for exchanging them among stakeholders.

DENTAL INFORMATICS AND THE ADA STANDARDS DEVELOPMENT PROGRAM

A few terms should be defined, to highlight the importance of standards in dentistry and orthodontics.

Information technology encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). It is a convenient term for including both telephone and computer technology. It is the technology that is driving what has often been called "the information revolution."

Medical informatics, as defined by Shortliffe et al,[1] is "the well-established scientific field of medicine that deals with biomedical information, data, and knowledge—their storage, retrieval, and optimal use for problem-solving and decision making."

Dental informatics is a subdivision of medical informatics and deals with information in dentistry.

Orthodontic informatics was first described by Harrell et al[2] as a subdivision of dental informatics that deals with the storage, retrieval, sharing, and optimal use of orthodontic, orthognathic, and dentofacial orthopedic information of the craniofacial region for decision making (diagnosis) and problem solving (treatment planning).

Another subdivision of health informatics is *imaging informatics*, which plays a significant role in orthodontics because, as clinicians and researchers, we use imaging every day in our practices. Imaging is the basis for representing anatomically true data and for *evidence-based orthodontics*. Shortliffe et al[1] describe the role of imaging in health care (imaging informatics) as "a central part of the assessment of response to treatment and estimation of prognosis. In addition, imaging plays important roles in medical communication and education as well as research."

THE ADA STANDARDS PROGRAM

What is a *standard*? A standard is a document that defines or provides specific technical requirements for a material, product, process, procedure, service, policy, and so on. It provides definitions, dimensions, terminology, symbols, test methods, and performance or safety requirements. It is clear, concise, unambiguous, and easily understood by those *not* involved in its development. A standard might codify existing technology or anticipate forthcoming products and services. It can be based on performance or design, and it might define a component or focus on interfaces between components. A standard can be local, national, regional, or international.

A *technical report* is different from a standard. A technical report is an informational document. It might describe a new technology or provide information on the state of the art. It might be used in conjunction with

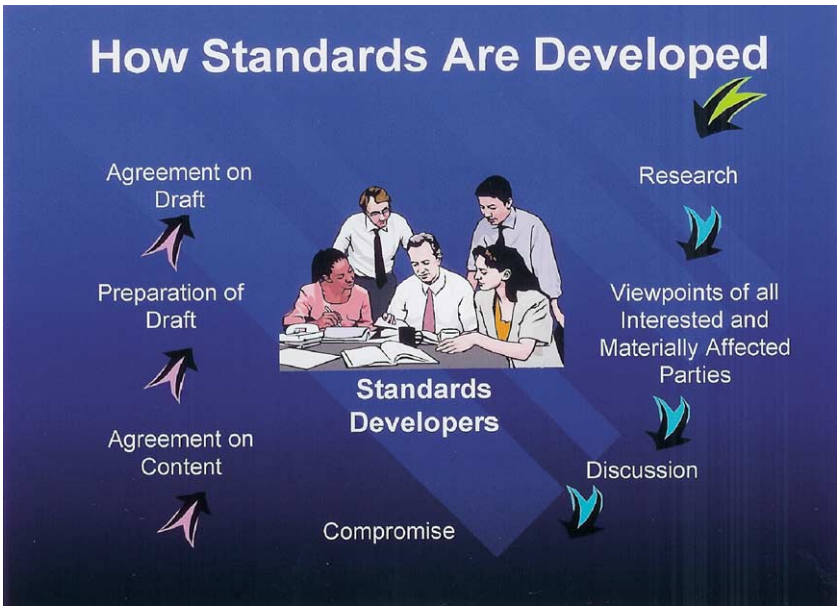

Fig 2. Standards are systematically developed from research phase to final draft.

an American national standard and provide implementation advice about a standard.

The ADA is a national and international leader in the development of standards, technical reports, and guidelines for materials, information, and technology impacting the practice of dentistry and the safety and health of the public.

The ADA has sponsored a standards program for dental materials, instruments, and equipment since 1928. Until 1953, all specifications were developed at the National Bureau of Standards by the federal government in cooperation with the ADA. Between 1953 and 1970, the Dental Materials Group of the International Association for Dental Research acted as the advisor to the ADA in developing specifications. Since 1970, the ADA has developed and approved standards for dental materials, instruments, and equipment through the sponsorship of some type of standards committee. The first committee, ANSI Committee MD156, became "accredited" by ANSI as Accredited Standards Committee MD156 in 1983. The ADA later applied for ANSI accreditation and was approved as an ANSI Accredited Standards Organization in March 2000.

As an ANSI-accredited organization, the ADA, through its Board of Trustees, has the authority to approve the development of a standards committee and approve its scope and affiliation with the appropriate ADA Council. Pursuant to ADA procedures, an ADA standards committee comprises volunteer technical experts who serve as representatives of organizations

Fig 3. ADA's standards committees are divided into 2 groups: committees on dental products (SCDP) and dental informatics (SCDI).

affiliated with the profession, dental industry, academia, and the government (Fig 2). The standards committee is the consensus body that approves all proposed standards, which are forwarded to ADA councils for approval as ADA standards and to ANSI for approval as American National Standards.

The ADA currently sponsors 2 separate standards committees (Fig 3). The ADA SCDP addresses standards for dental materials, instruments, equipment, and oral hygiene products, and the ADA SCDI addresses items such as dental practice systems, diagnostics,

clinical peripheral devices and software, electronic data interchange, computer-based patient record interfaces, and dental education and research systems.

The ADA SCDP comprises 36 voting and 3 liaison members from 24 organizations. The actual standards development occurs in its 8 subcommittees and 60 working groups. The subcommittees are restorative materials and orthodontic products, prosthodontic materials, terminology, instruments, equipment, implants, oral-hygiene products, and infection-control products. The working groups address specific topics and allow all interests to participate in developing voluntary consensus standards. The working groups are composed of volunteers from the profession, industry, academia, and government. The scope of the committee is

- Nomenclature, standards, and specifications for dental materials, except those recognized as drugs and dental radiographic film.
- Nomenclature, standards, and specifications for instruments, equipment, and accessories used in dental practice, dental technology, and oral hygiene, which are offered to the public or the profession.
- Orthodontic, prosthetic, and restorative appliances designed or developed by the dentist for an individual patient are excluded.

Of interest to American Association of Orthodontists members is SCDP Working Group 1.7, which develops standards for orthodontic products. This group has published 2 orthodontics standards, ANSI/ADA Specification No. 32 for orthodontic wires and ANSI/ADA Specification No. 100 for orthodontic brackets and tubes. Other orthodontic product standards are in development.

The ADA SCDI is composed of 55 voting members from 54 organizations. The SCDI is organized into 4 subcommittees and 17 groups working to develop or revise 28 technical reports or specifications/standards. The subcommittees are grouped according to the following general subject matters: dental informatics architecture and devices, electronic dental records, informatic component interoperability in dentistry, and electronic dissemination of dental information. The working groups, organized under the subcommittees, address specific topics and allow all interests to participate in developing voluntary consensus standards.

The scope of the SCDI is

"To promote patient care and oral health through the application of information technology to dentistry's clinical and administrative operations; to develop standards, specifications, technical reports, and guidelines for components of a computerized dental clinical workstation; electronic technologies used in dental practice; and interoperability standards for different software and hardware products to provide a seamless information exchange throughout all facets of health care."

The ADA also sponsors participation in ANSI activities of the International Organization for Standardization (ISO) Technical Committee (TC) 106 on Dentistry through the administration of the US Technical Advisory Group (TAG). The US TAG for ISO/TC106 is responsible for recommending the US vote on all international dental standards and for determining the US position on the development of international standards. The ADA also acts as secretariat for ANSI for Subcommittee 2 on Prosthodontic Materials and Subcommittee 8 on Dental Implants of ISO/TC 106.

The ADA also actively participates in the US TAG and committee work groups of ISO TC 215 on Health Informatics. Increasingly, the health record format and content transcend national boundaries for patients, health professionals, and vendors. Consistency of content, terminology, and format are essential for general health care use. Thus, the ADA works both nationally and internationally to form standards for dental products and technologies.

At this time, the ADA SCDI is seeking volunteers from the orthodontics community to join the working group that will develop the orthodontics informatics standards. For more information on participating in the working group, please contact the ADA's Paul Bralower at bralowerp@ada.org or telephone (312) 587-4129.

REFERENCES

1. Shortliffe E, Perreault LE, Wiederhold G, Fagan I. Medical informatics: computer applications in health care and biomedicine. 2nd ed. New York; Springer-Verlag; 2001.
2. Harrell WE, Hatcher DC, Bolt RL. In search of anatomic truth: 3-dimensional digital modeling and the future of orthodontics. Am J Orthod Dentofacial Orthop 2002;122:325-30; correction 2003; 123:93.