



American National Standard/
American Dental Association
Specification No. 1000

Standard Clinical Data Architecture for the Structure And Content of an Electronic Health Record

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**AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION SPECIFICATION NO. 1000 FOR
STANDARD CLINICAL DATA ARCHITECTURE FOR THE STRUCTURE AND CONTENT OF AN ELECTRONIC
HEALTH RECORD**

The Council on Dental Practice of the American Dental Association has approved American Dental Association Specification No. 1000 for a Standard Clinical Architecture for the Structure and Content of an Electronic Health Record. Working Groups of the ADA Standards Committee on Dental Informatics (SCDI) completed this specification and continue to formulate other specifications for the application of information technology and other electronic technologies to dentistry's clinical and administrative operations. The ADA SCDI has representation from appropriate interests in the United States in the standardization of information technology and other electronic technologies used in dental practice. The specification was forwarded to the American National Standards Institute with a recommendation that the specification be approved as an American National Standard. Approval of ADA Specification No. 1000 as an American National Standard was granted by the American National Standards Institute on February 2, 2001. This standard becomes effective February 2, 2001.

The ADA SCDI thanks Mark Diehl, Mark Diehl Consulting, Frederick, Maryland, as Chairman of Subcommittee 11 for Electronic Dental Records for leading the development effort.

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FOREWORD

(This foreword is not a part of the ANSI/ADA Specification No. 1000 for Standard Clinical Data Architecture for the Structure and Content of an Electronic Health Record).

In 1992, there was interest in the standardization of clinical information systems related to electronic technology in the dental environment. After evaluating current informatics activities, a Task Group of the Accredited Standards Committee MD156 (ASC MD156) was created by the ADA to initiate the development of technical reports, guidelines, and standards on electronic technologies used in dental practice. In 1999, the ADA established the ADA Standards Committee on Dental Informatics (SCDI). The ADA SCDI is currently the group that reviews and approves proposed American National standards (ANSI approved) and technical reports developed by the standards committee's working groups. The ADA became an ANSI accredited standards organization in 2000.

The scope 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 a computerized dental clinical workstation; 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 healthcare."

Mark Diehl, Chairman, ADA SCDI Subcommittee 11 on Electronic Dental Records, led the development effort of this specification at the request of the ADA Standards Committee on Dental Informatics.

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION SPECIFICATION NO. 1000 FOR STANDARD CLINICAL DATA ARCHITECTURE FOR THE STRUCTURE AND CONTENT OF AN ELECTRONIC HEALTH RECORD

1. BACKGROUND

“The outstanding problem of the medical profession today is that involved in the delivery of adequate, scientific medical service to all the people, rich and poor, at a cost which can be reasonably met by them in their respective stations in life.”¹

This statement by Dr. Olin West is taken from a report of the Committee on the Costs of Medical Care, in what is widely regarded as the first attempt to link health service need with resource requirements. After sixty years the fundamental problem with the health care delivery system remains too little health delivered for too great a cost. Automation technology offers opportunities to improve health and reduce cost through efficient information management.

In 1992 the ADA House of Delegates adopted four resolutions on issues of electronic technology in dentistry. Resolution 18H-1992 (Trans. 1992:597) addressed facilitating the development of a computer-based dental patient record. Publication of the baseline Computer-based Oral Health Record (COHR) Concept Model was the first step in complying with that Resolution and ultimately leads to a standard specification for patient, health and health care related information..

As a first step in complying with this Resolution, the ADA Council on Dental Practice convened a COHR Working Group whose members had expertise in paper-based records systems, computer applications in clinical care, and experience developing computer-based records systems in academia and the government. Their objective was to determine those features of functionality that offer greatest utility to all aspects of patient healthfulness and care delivery, addressed issues of open architecture, and were technology independent.

The Working Group selected a model-based analytical approach and in 1994 began analysis of the care delivery processes and the information requirements to support these processes. The activity analysis proved that the term computer-based patient records actually means computer-based patient information and that this data model would function at Level 5 of patient information.² This analysis also revealed healthcare information has value in the context of its contribution to a beneficial outcome of patient care.

The model was reviewed, modified and approved by the COHR Working Group in April. In May 1995, the Council on Dental Practice approved public release of the Concept Model for general comment that led to publication of Version 0.9 Draft for Comment by the ADA in July 1995. Comments were received and revisions were recommended during consensus-building sessions at several professional meetings. The Concept Model baseline version 1.0 was then published in February 1996 to present the consensus opinion of the Working Group and the large body of reviewers and attendees at these sessions.

The Working Group found that because healthcare is frequently delivered across boundaries of profession, discipline, specialty and care delivery environment, healthcare information must seamlessly cross these boundaries to contribute to economical and efficient delivery of quality health services. The Working Group found that 5 fundamental criteria are essential for information to contribute to quality health care outcomes and efficient and economical care delivery:

- A Quality—complete and accurate information available.
- B Utility—information presented in a form optimally suited to the user.
- C Proximity—information available at the time and place needed.
- D Accessibility—seamless availability across boundaries of healthcare profession, or care delivery environment.
- E Confidentiality—access to identity-linked information limited to those parties authorized by patient consent.

Availability of such health information at the point of decision will enable the patient, caregiver and manager to efficiently use automation to achieve long sought optimal quality and economy in care delivery.

Subsequently in 1996 the ADA House of Delegates adopted Resolution 92H-199, which states that patient information must be seamlessly available at the time and point of care to all authorized users, with no compartmentalization by profession, specialty, discipline or care delivery environment. Recognizing the need to move ahead in improving healthcare information management, Resolution 92H-1996 further states:

“The American Dental Association believes that, for optimal patient benefit, with assurance of confidentiality safeguards, appropriate health information should be available at the time and place of care to practitioners authorized by the patient through the development of a computer-based patient health record.”

The history of this standards activity began with a 1994 initiative by the American Dental Association to study the information component of electronic technology applications in dentistry and healthcare. A workgroup studied the healthcare environment, analyzed the healthcare processes and determined the fundamental characteristics of healthcare information. The efforts of the COHR Working Group resulted in the publication of a benchmark Concept Model in early 1996. This concept model contained both activity model and data model view components. The COHR Concept Data Model was subsequently converted into a logical data model (COHR-LDM) by consolidating the various data views into a single comprehensive data model, rigorously applying data modeling rules, and then breaking out the model diagrams in numerous more readily understood subject areas.

The ADA sponsored ANSI Accredited Standards Committee MD156 undertook development of this Concept Model into a standard specification according to an ANSI PINS submission of September, 1995. The Concept Data Model was used as a foundation to develop a logical data model. A first draft of the COHR Logical Data Model was prepared from the baseline concept model in November 1995, and the draft specification was released for public comment as an 18-component multipart document from April 1997 through November 1998.

These documents were distributed by mail and at numerous and health information technology professional meetings. Both written and oral comments were solicited - these were reviewed collectively with the logical data model and documents modified accordingly. The content of these multipart documents was then prepared as the version 1.0 of the standard specification presented in this document.

This specification document is the compilation of a series of eighteen subject area publications that illustrated this generic logical data model:

A Introduction, Architecture and Framework.

B Individual Identification.

C Codes and Nomenclature.

D Individual Characteristics.

E Population /Population Characteristics.

F Organization.

G Location.

H Communication.

I Health Care Event.

J Health Care Materiel.

K Health Services & Outcomes.

L Health Service Resources.

M Population Health Facts.

N Patient Health Facts.

O Health Condition Diagnosis.

P Patient Service Plan.

Q Patient Health Service.

R Clinical Investigation.

These documents were published by the American Dental Association from April 1997 through November 1988 and distributed for public review. The proposed specification was subsequently revised based on comments received.

2. Purpose

The purpose of this specification is to create and introduce an organizing framework for the components of the standard specification. This healthcare information architecture is independent of, profession and

specialty, care delivery environment, and management approach, and free of cultural and language constraints. This specification document presents the modeling method, rationale, and nomenclature, as well as the logical data model structures and metadata composing the specification.

This specification is a dynamic, living document that will be maintained current with advances in the professional arts and sciences of health service and the changing environment of health care delivery.

3. SCOPE

While the content of this document has broad utility to a wide range of health and health care information systems it is targeted for application at the data level of tiered system architectures.

Tiered architectures are a means to understand, design and implement computer systems following principles of isolation by function. The Conference on Data Systems and Languages (CODASYL) prepared the tiered architecture as a means to rationalize system organization and operation.³ This architecture isolated the user, program and data in a form that promoted efficiency and reduced error.

Both the conventional client-server and Web-enabled architectures are examples of how this three-tiered architecture can be readily implemented. The client-server architecture is found widely in contemporary healthcare systems, and is generally considered as employing three distinct *layers*, or clusters of system components:

Layer	Characteristic
Presentation Layer	Typically a graphic user interface, but can be any device or technology that interacts with a human or another computer system.
Application Layer	The collection of programs and program modules, consisting of machine instructions that perform processes that implement system functionality.
Data Layer	The data structures and data or objects that are acted upon by the application programs.

In the Client-Server architecture, the presentation layer equates to the External Schema, the application layer interface to the data layer corresponds to the Conceptual Schema and the Data Layer corresponds to the Physical Data Interface.

4. FIELD OF APPLICATION

Health informaticists widely recognize that while speaking of the Computer-based Patient Record we actually mean *Computer-based Patient Information*.⁴ Information is a critical element in the health care decision-making process. Accurate information, presented in a form suitable to the user, at the time and place of health care delivery is essential for timely, appropriate and quality health services. For the greater part of this century the traditional vehicle to collect, organize, store and present patient health information has been the paper-based patient record (PBR). The PBR and its implementing information systems have, however, become progressively inadequate in an increasingly information intensive health care delivery environment. During the 1950s and 1960s medical informatics pioneers began seeking ways to apply automation technology to the PBR as a remedy for its inherent deficiencies.⁵