

American Dental Association
Technical Report No. 1060

The Secure Exchange and Utilization of Digital Images in Dentistry

*A Technical Report prepared by the American Dental Association
and registered with ANSI.*

ADA American
Dental
Association®

This is a preview of "ADA TR 1060-2011". [Click here to purchase the full version from the ANSI store.](#)

ADA TECHNICAL REPORT NO. 1060 FOR THE SECURE EXCHANGE AND UTILIZATION OF DIGITAL IMAGES IN DENTISTRY

The Council on Dental Practice of the American Dental Association has approved American Dental Association Technical Report No. 1060 for the Secure Exchange and Utilization of Digital Images in Dentistry. Working Groups of the ADA Standards Committee on Dental Informatics (SCDI) formulate this and other specifications and technical reports 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 ADA Standards Committee on Dental Informatics confirmed approval of ADA Technical Report No. 1060 on January 13, 2011.

Publication of this technical report that has been registered with ANSI has been approved by the American Dental Association, 211 E. Chicago Ave., Chicago, IL 60611. This document is registered as a technical report according to the *Procedures for the Registration of Technical Reports with ANSI*. This document is not an American National Standard and the material contained herein is not normative in nature. Comments on this document should be sent to the American Dental Association, 211 E. Chicago Ave., Chicago, IL 60611.

This technical report was prepared at the request of SCDI Working Group 12.1 for Digital Imaging by Jie Yang, Dania Tamimi, Allan G. Farman, Scott Benjamin, Kitrina G. Cordell and Gregory G. Zeller.

The ADA Standards Committee on Dental Informatics thanks the members of Working Group 12.1 and the organizations with which they were affiliated at the time the report was developed:

Scott Benjamin (Co-chairman), Advanced Integration and Mentoring, Inc., Hancock, NY;

Xavier Carayol (Co-chairman project leader), Trophy Radiologie, Croissy-Beaubourg, France;

Eric Blaschka, Sirona USA, Charlotte, NC;

Chris Bope, Soredex, Tuusula, Finland;

Paul Bralower, American Dental Association, Chicago, IL;

Andrew Casertano, Department of Defense Military Health Systems, N. Potomac, MD;

Richard M. Celko, P& R Dental Strategies, Inc., New York, N.Y.;

Igor Chertok, Gendex Dental Systems, Woodale, IL;

Kitrina G. Cordell, University of Michigan, Ann Arbor;

Carla Evans, University of Illinois at Chicago, IL;

Allan G. Farman, University of Louisville, KY;

Hartmut Feuerhahn, Dexis, LLC, Berlin, Germany;

Gilbert Frellick, Air Techniques, Inc., Melville, NY;

Jim Garrett, Patterson Dental, Effingham, IL;

Lance Guffey, Patterson Dental, Effingham, IL;

William E. Harrell, Jr., American Association of Orthodontists, Alexander City, AL;

Jim Hughes, Dentrax Dental Systems, American Fork, UT;

Ari Kontkanen, Planmeca, Inc., Roselle, IL;

Erkki Lehto, Planmeca, Inc., Roselle, IL;

Jolanta Majewska, ADSTRA Systems, Inc., Toronto, Canada;
Antonio Magni, topsOrtho, Marietta, GA;
Roberto Molteni, QR, Verona, Italy;
Michael Null, GE Instrumentarium, Milwaukee, WI;
J. Martin Palomo, Case Western Reserve University, Cleveland, OH;
Eleonore Paunovich, Department of Veterans Affairs, San Antonio, TX;
James Pearson, American Association of Orthodontists, St. Louis, MO;
Manny Pena, Schick Technologies, Inc., Long Island City, NY;
Yehuda Rosenstock, Air Techniques, Melville, NY;
Theodore Steinhausen, Aribex, Inc., Orem UT;
Dania Tamimi, Epic Teleradiology, Orlando, FL;
Scott Trapp, White Earth Health Center, Ogema, MN;
Don Vu, J. Morita Mfg. Corp., Irvine, CA;
Jie Yang, Temple University, Philadelphia, PA;
Gregory G. Zeller, Department of Veterans Affairs, Baltimore, MD; and
Jurgen Zimmermann, Sirona Dental Systems, Bensheim, Germany.

ADA TECHNICAL REPORT NO. 1060 FOR THE SECURE EXCHANGE AND UTILIZATION OF DIGITAL IMAGES IN DENTISTRY

FOREWORD

(This Foreword does not form a part of ADA Technical Report No. 1060 for the Secure Exchange and Utilization of Digital Images in Dentistry).

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 ANSI 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 standards and 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.

ADA TECHNICAL REPORT NO. 1060 FOR THE SECURE EXCHANGE AND UTILIZATION OF DIGITAL IMAGES IN DENTISTRY

CONTENTS

Scope and Purpose	5
Introduction.....	5
Dental Digital Diagnostic Image Format – DICOM.....	5
4.0. Methods for Secure Transmission of Dental Digital Images.....	6
4.1. E-mail Transport.....	6
4.2. Web Services.....	7
4.3 Other Secure Transmission Services.....	7
5.0. Constraints to Secure Electronic Exchange of Dental Digital Images.....	7
6.0. Recommended Actions.....	8
6.1. Rationale for recommended actions to standardize secure image exchange in dentistry.....	8
6.2. General parameters for the acquisition and exchange of secure images	9
6.3. Image security.....	9
6.4. Develop and apply secure transmission standards to existing image file data exchanges in dentistry.....	10
6.5. Consider promotion of the concept of the “virtual patient”.....	10
6.6. Summary of recommended actions.....	10
7.0 References.....	10
8.0 Additional Bibliography.....	11
8.1. DICOM.....	11
8.2. Security.....	13
8.3. Teledentistry.....	13
8.4 CAD/CAM	14
8.5. Telepathology.....	15
9.0 Glossary of Acronyms.....	16

ADA TECHNICAL REPORT NO. 1060 FOR THE SECURE EXCHANGE AND UTILIZATION OF DIGITAL IMAGES IN DENTISTRY

1.0 SCOPE AND PURPOSE

This report outlines methods for the secure electronic exchange and utilization of electronic digital image files, including those requiring diagnostic quality. Such images may include diagnostic radiographs, intraoral and extra-oral photographs, video, optical impressions and oral pathology photomicrographs. Caution is advised against the utilization of unsecure exchange transmission modes, such as unencrypted e-mail attachments sent over the Internet or any other unsecured electronic exchange not conforming to accepted security transmission standards. Secure electronic exchange can be utilized for a variety of purposes, such as storage of archived data in a location physically separated from the practice, distance consultation, fabrication of image-based appliances or for financial and other administrative purposes. Currently available practices and existing constraints to diagnostic image exchange are reviewed and potential solutions offered.

The purpose of this report is to outline the means of secure electronic exchange of diagnostic quality digital radiographs, photographic images and other imaging modalities used in dentistry.

2.0 INTRODUCTION

New digital imaging technologies are driving change in dental practice. An increasing number of dentists are using digital dental imaging for radiography, photography and as an adjunct to Computer Aided Design/Computer Aided Manufacture (CAD/CAM) fabrication of devices. (See Bibliography for selected references.) The increasing sophistication of dental software and digital equipment, along with the common availability of fast internet service, has made the electronic exchange of image files via Internet communication channels not only a reality, but a necessity in dental practice at this time.

Digital dental imaging modalities save both time and physical storage space for practitioners when compared with conventional film-based radiography and photography. Digital imaging also offers environmental benefits through the elimination of chemicals used for film processing. In addition, digital images can be transmitted through secure communications for efficient consultation over distance, third party payment, integration with patient record systems, secure backup and for research and educational purposes. The reduced radiation levels associated with digital imaging also may increase patient safety.

Some trusted methods for secure electronic exchange of digital radiographic and photographic images are currently in use for dental diagnosis and treatment. Several dental commercial entities utilize the secure transmission of digital diagnostic images for such purposes as: construction of orthodontic appliances; fabrication of surgical implant templates and implant prostheses; production of anatomic models for surgical planning; and image conversion for radiologic interpretation services, e.g., maxillofacial Cone Beam Computed Tomography (CBCT). All of these services depend on secure electronic transfer of digital diagnostic images, generally associated with protected health information (PHI). Also, dental practices frequently utilize electronic exchange of digital or digitized radiographs, photographs and other imaging modalities for consultation or third party treatment approval and payment procedures.

3.0 DENTAL DIGITAL DIAGNOSTIC IMAGE FORMAT- DICOM

Digital diagnostic image files require headers or tags that have unique identifiers and additional data such as when and how the image was acquired and characteristics of the image, including orientation and verification of the original and adjusted state. The American Dental Association (ADA) has resolved that the interoperable exchange of dental diagnostic image file formats should be in compliance with the DICOM (Digital Imaging and Communication in Medicine) Standard. DICOM is a standard referenced by the International Organization for Standardization.¹ Dentists are strongly advised to