

# **Health Informatics**

*(formerly Computers in Health Care)*

---

Kathryn J. Hannah    Marion J. Ball  
Series Editors

For other titles published in this series, go to  
[www.springer.com/series/1114](http://www.springer.com/series/1114)

Christoph U. Lehmann • George R. Kim  
Kevin B. Johnson  
Editors

# Pediatric Informatics

Computer Applications in Child Health

 Springer

*Editors*

Christoph U. Lehmann  
The Johns Hopkins School of Medicine  
Baltimore, MD  
USA

George R. Kim  
The Johns Hopkins School of Medicine  
Baltimore, MD  
USA

Kevin B. Johnson  
Vanderbilt University School of Medicine  
Nashville, TN  
USA

ISBN: 978-0-387-76445-0      e-ISBN: 978-0-387-76446-7  
DOI: 10.1007/978-0-387-76446-7  
Springer Dordrecht Heidelberg London New York

Library of Congress Control Number: 2009926513

© Springer Science+Business Media, LLC 2009

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

While the advice and information in this book are believed to be true and accurate at the date of going to press, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

Springer is part of Springer Science+Business Media ([www.springer.com](http://www.springer.com))

# Series Preface

This series is directed to Health care professionals who are leading the transformation of health care by using information and knowledge. Historically the series was launched in 1988 as *Computers in Health Care*, to offer a broad range of titles: some addressed to specific professions such as nursing, medicine, and health administration; others to special areas of practice such as trauma and radiology; still other books in the series focused on interdisciplinary issues, such as the computer based patient record, electronic health records, and networked Health care systems. Renamed *Health Informatics* in 1998 to reflect the rapid evolution in the discipline known as health Informatics, the series continued to add titles that contribute to the evolution of the field. In the series, eminent experts, serving as editors or authors, offer their accounts of innovations in health Informatics. Increasingly, these accounts go beyond hardware and software to address the role of information in influencing the transformation of Health care delivery systems around the world. The series also increasingly focused on the users of the information and systems: the organizational, behavioral, and societal changes that accompany the diffusion of information technology in health services environments.

Developments in health care delivery are constant; most recently developments in proteomics and genomics are increasingly becoming relevant to clinical decision making and emerging standards of care. The data resources emerging from molecular biology are beyond the capacity of the human brain to integrate and beyond the scope of paper based decision trees. Thus, bioinformatics has emerged as a new field in health informatics to support emerging and ongoing developments in molecular biology. Translational informatics supports acceleration, from bench to bedside, i.e. the appropriate use of molecular biology research findings and bioinformatics in clinical care of patients.

At the same time, further continual evolution of the field of Health informatics is reflected in the introduction of concepts at the macro or health systems delivery level with major national initiatives related to electronic health records (EHR), data standards and public health informatics such as the Health care Information Technology Standards Panel (HITSP) in the United States, Canada Health Infoway, NHS Connecting for Health in the UK.

We have consciously retained the series title *Health Informatics* as the single umbrella term that encompasses both the microscopic elements of bioinformatics and the macroscopic aspects of large national health information systems. Ongoing

changes to both the micro and macro perspectives on health informatics will continue to shape health services in the twenty-first century. By making full and creative use of the technology to tame data and to transform information, health Informatics will foster the development and use of new knowledge in health care. As coeditors, we pledge to support our professional colleagues and the series readers as they share advances in the emerging and exciting field of Health Informatics.

Kathryn J. Hannah  
Marion J. Ball

# Foreword

Clinical informatics by its very nature is flexible, interdisciplinary, and dynamic. Ever changing, ever adjusting to novel clinical needs and emerging information technologies, it focuses upon a constantly moving target. If the field is so dynamic, why is a text still useful in a Web 2.0 era? Two major reasons come to mind.

First, pediatric informatics is a new and emerging field and it is crucial that learners have access to a definitive source that lays out the boundaries of the discipline. This book does just that for the first time and does it well. It will be very apparent to the reader that the discipline is growing exponentially, supporting routine clinical care, offering more timely communications with parents and patients via personal health records, transforming practice through dynamic decision support, linking data to population and public health objectives, and supporting clinical and informatics research.

Second, clinical informatics can enhance equity, safety, efficiency, timeliness, and effectiveness and can make the patient, the child or adolescent along with his or her loved ones much more the center of action. While the book contains chapters on informatics topics that are not unique to pediatrics, its authors focus on the direct linkage of informatics and information technology to pediatric clinical work. They illustrate through many examples the transformative potential of informatics to impact positively on pediatric practice by addressing longstanding weaknesses of solely memory-based clinical care and strengthening connections among families and caregivers through communications technology.

Clinical informatics will play a vital role in defining new standards for clinical excellence. The American Medical Informatics Association (AMIA) believes the pool of health professionals who bring informatics knowledge, attitudes, and skills to clinical domains such as pediatrics must expand and deepen. For the last several years, AMIA has worked (with support from the Robert Wood Johnson Foundation) to create a medical sub-specialty of clinical informatics for all 24 boards recognized by the American Board of Medical Specialties. In 2008, it began active work to strengthening training and establishing informatics certification for other doctorally-prepared clinicians (e.g., nurses, pharmacists, and dentists among others).

I am confident that pediatricians will constitute a solid part of this expanded pool of clinical informaticians. Indeed, until such properly trained pediatric informaticians working in interdisciplinary teams can integrate informatics and communications technology into practice, children and their families will be the lesser for it.

This text will prove useful to a wide set of readers interested in clinical informatics and serve as an anchoring text for the emergence of a new full member of the health care team, the well-trained clinical pediatric informatician.

Don E. Detmer, MD, MA, FACMI, FACS  
President and CEO, American Medical Informatics Association, Bethesda, MD  
Professor of Medical Education, University of Virginia, Charlottesville, VA

# Preface

This book is the product of over 2 years of collaboration by colleagues who have been involved in pediatric informatics. The evolution of this community has been driven by common interests of pediatricians that have coalesced because of increasing concerns about patient safety, the desire to improve and measure the quality of patient care and the growing realization that health information technology has much to offer to improve child health, but that it must be tailored to meet those needs. The growth of the community has been facilitated by the increasing availability and use of e-mail and other communication tools by pediatricians, which has kindled interest.

Many pediatricians became acquainted with pediatric health information technology (health IT) and informatics through a special interest group (SIG), the Section on Computers and Other Technologies (SCOT) in the American Academy of Pediatrics (AAP). This informal group of pediatricians, assembled by pediatrician Byron Oberst, MD FAAP, met once or twice yearly, sharing explorations and experiments with “new” computing technologies (remember the Newton?) in practice. Through the 1990s, the AAP moved from being primarily a paper-based information organization to a “wired” one, moving publications, member notifications (of events such as changes in immunization schedules) and child advocacy to the electronic superhighway. SCOT and the affiliated Task Force on Medical Informatics (TFOMI) became the Steering Committee (SCOCIT) and currently is the Council on Clinical Information Technology (COCIT). Membership grew and COCIT is now a source of educational programs, policy statements, and technical expertise on health IT as it applies to child health and pediatric management.

The community has been buoyed by connections to other communities, ranging from university informatics training programs (supported by the National Library of Medicine), health information exchanges (HIEs), government agencies, patient safety groups and other domains, including pediatric nursing, pediatric pharmacy, and medical education. In all these arenas, there have been pediatric leaders who have helped shape the agenda of pediatric informatics.

We live in an “interesting time” as the US faces many challenges. Pediatric practices face new and growing pressures for accountability and reporting of quality measures as well as the need to improve practice and demonstrate value. Health IT can provide solutions but currently has low adoption in practice and requires



financial investment and risk that practices that operate at low margins including safety net clinics may not be able to afford, given the current economic climate and the increasing costs and complexities of care (such as interruptions in vaccine availability). In addition, for pediatric practices, some aspects of health IT and standards is still in development. These factors, among others, have been the driving force for the creation of this text.

The intent of this book is twofold. One is to introduce pediatricians to current concepts in health IT relevant to child health and to provide linkages to available literature, resources and expertise and experience on the various topics covered. The second is to introduce informaticians and other health IT professionals to the needs and nuances of child health with regard to technology and information standards development. It does not replace authoritative texts in pediatrics or medical informatics, but creates necessary connections in this area of clinical informatics.

Christoph U. Lehmann, MD, FAAP  
George R. Kim, MD, FAAP  
Kevin B. Johnson, MD FAAP

# Acknowledgments

The editors would like to acknowledge persons and groups who have contributed directly and indirectly to the completion of this text:

- Marion J. Ball EdD, for creating the opportunity for us to put this together
- The individual chapter authors, for their time and expertise
- Don E. Detmer MD MA, from the American Medical Informatics Association
- Beki Marshall, Jen Mansour and Errol R. Alden MD FAAP from the American Academy of Pediatrics (AAP) and its Council on Clinical Information Technology (COCIT)
- The Johns Hopkins University School of Medicine Divisions of Health Sciences Informatics and Neonatology
- S. Andrew Spooner MD MS FAAP from the Cincinnati Children’s Hospital Medical Center for feedback and discussion
- Teresa Gillespie from Vanderbilt University, for editorial assistance and support
- Susan and Jerry Aronson (both MD FAAP), friends, colleagues, mentors, pediatricians, and leaders in advocacy and the use of technology in child health
- The staff at Springer: Cate Rogers Padmaja Sudhaker and Grant Weston for publication support

Christoph U. Lehmann, MD, FAAP  
George R. Kim, MD, FAAP  
Kevin B. Johnson, MD FAAP

# How to Use This book

This book is the first attempt at a comprehensive text on Pediatric Informatics. Compiling the information took over two years and fifty authors. Pediatrics is an ever changing science and research in Pediatric Informatics continues to generate new knowledge. While this book represents the compiled knowledge of the editors and authors of the field, readers are advised to use the information as a basis for further research. This book will serve as a starting point for health IT implementation endeavors, but it does not absolve readers from conducting further due diligence efforts. The editors and the authors are not endorsing any of the products mentioned in this book.

# Contents

## Part I Introduction to Pediatric Informatics

- 1 **Snapshots of Child Health and Information Technology** ..... 3  
George R. Kim
- 2 **Informatics and Pediatric Health Care**..... 5  
Kevin B. Johnson and George R. Kim

## Part II Special Considerations in Pediatric Care

- 3 **Core Pediatric Data** ..... 19  
Kevin B. Johnson, Stuart T. Weinberg and George R. Kim
- 4 **Neonatal Care and Data** ..... 25  
Declan O’Riordan and Peter J. Porcelli Jr.
- 5 **Special Health Information Needs of Adolescent Care** ..... 43  
David M.N. Paperny
- 6 **Children with Developmental Disorders  
and Other Special Needs** ..... 55  
Larry W. Desch and Paul H. Lipkin
- 7 **Pediatric Emergency and Pediatric Critical Care Considerations**..... 69  
Mark A. Del Beccaro, Howard E. Jeffries and George R. Kim

## Part III The Pediatric Data-Knowledge-Care Continuum

- 8 **Complexity in Healthcare Information Technology Systems**..... 83  
Willa H. Drummond, Jeffrey M. Ferranti,  
Christoph U. Lehmann and Donald E. Lighter

**9 Pediatric Care, Safety, and Standardization** ..... 119  
 Anne Matlow and John M. A. Bohnen

**10 Evidence-Based Medicine and Pediatrics** ..... 133  
 Donna M. D’Alessandro

**11 Clinical Practice Guidelines: Supporting Decisions,  
 Optimizing Care**..... 149  
 Richard N. Shiffman

**12 Diagnostic Decision Support** ..... 161  
 Mitchell J. Feldman

**13 Managing Pediatric Knowledge Resources in Practice** ..... 185  
 Prudence W. Dalrymple, Bernard A. Cohen and John S. Clark

**14 Supporting Continuing Pediatric Education and Assessment**..... 197  
 Peter S. Greene, Valerie Smothers and Toby Vandemark

**Part IV Informatics and Pediatric Ambulatory Practice**

**15 Pediatric Care Coordination: The Business Case  
 for a Medical Home**..... 205  
 Donald E. Lighter

**16 Prioritizing Pediatric Investment for IT in Smaller Practices** ..... 221  
 Mark M. Simonian

**17 Aligning Pediatric Ambulatory Needs with Health IT** ..... 233  
 Michael G. Leu, George R. Kim, Ari H. Pollack,  
 and William G. Adams

**18 Electronic Health Records and Interoperability  
 for Pediatric Care**..... 257  
 George R. Kim and Christoph U. Lehmann

**19 Ambulatory Computerized Provider Order Entry  
 (ACPOE or E-Prescribing)**..... 265  
 Kevin B. Johnson and Carl G.M. Weigle

**20 Telemedicine Applications in Pediatrics** ..... 279  
 Craig Sable, Molly Reyna and Peter R. Holbrook

**21 Personal Health Records** ..... 293  
 Alan E. Zuckerman and George R. Kim

**22 Privacy Issues** ..... 303  
David M.N. Paperny

**23 Electronic Mail in Pediatric Practice** ..... 311  
Robert S. Gerstle

**24 Information Management by Patients and Parents  
in Health and Disease**..... 319  
Mark M. Simonian

**Part V Informatics and Pediatric Inpatient Practice**

**25 Overview of Pediatric Inpatient Medication Delivery**..... 331  
George R. Kim and Robert E. Miller

**26 Prescribing/Ordering: Computerized Order Entry  
and Decision Support**..... 335  
Christoph U. Lehmann and George R. Kim

**27 Dispensing: Pharmacy Information Systems** ..... 345  
Sandra H. Mitchell, Michael A. Veltri and George R. Kim

**28 Medication Administration and Information Technology** ..... 357  
Catherine Garger, Carol Matlin, George R. Kim,  
and Robert E. Miller

**29 Understanding and Preventing Errors**..... 369  
Michael Apkon

**30 Error Reporting Systems**..... 385  
David C. Stockwell and Anthony D. Slonim

**Part VI Frontiers in Pediatric Informatics**

**31 Communities of Pediatric Care and Practice** ..... 399  
Joseph H. Schneider

**32 Developing Pediatric Data Standards** ..... 415  
S. Trent Rosenbloom and Joy Kuhl

**33 The Case for a Pediatric Terminology**..... 429  
George R. Kim and S. Trent Rosenbloom

**34 Pediatric Research and Informatics**..... 439  
Harold P. Lehmann, Paul A. Law and Allen Y. Tien

**Part VII A Vision and Current Landscape of Pediatrics**

**35 The Moving Picture of Pediatric Informatics..... 457**  
George R. Kim and Stuart T. Weinberg

**36 Appendix: A Community of Child Health and Informatics..... 469**  
George R. Kim and Kevin B. Johnson

**Index..... 475**

# Contributors

**William G. Adams, MD FAAP**

Associate Professor of Pediatrics  
Director, Child Health Informatics  
Department of Pediatrics  
Boston University School of Medicine, Boston MA

**Michael Apkon, MD PhD FAAP**

Associate Clinical Professor of Pediatrics  
Yale University School of Medicine  
Vice President, Executive Director  
Yale-New Haven Children's Hospital, New Haven CT

**John M. A. Bohnen, MD FRCS FACS**

Professor of Surgery and Health Policy, Management and Evaluation  
Vice-Dean, Clinical Affairs  
University of Toronto, Toronto ON Canada

**John S. Clark, PharmD MS BCPS**

Associate Director of Pharmacy,  
Pharmacy Residency Program Director,  
University of Michigan Hospitals and Health Centers  
Assistant Clinical Professor  
University of Michigan College of Pharmacy, Ann Arbor MI

**Bernard A. Cohen, MD FAAP**

Professor of Dermatology and Pediatrics  
The Johns Hopkins University School of Medicine  
Director of Pediatric Dermatology  
The Johns Hopkins Children's Center, Baltimore MD

**Prudence W. Dalrymple, PhD AHIP MS (Informatics)**

Director, Institute for Healthcare Informatics  
The iSchool at Drexel, College of Information Science & Technology  
Drexel University, Philadelphia PA



**Donna M. D'Alessandro, MD FAAP**

Professor of Pediatrics  
University of Iowa, Iowa City IA  
Communications Director, Academic Pediatric Association  
Member, Executive Committee of the Council on Clinical Information  
Technology  
American Academy of Pediatrics

**Mark A. Del Beccaro, MD FAAP**

Professor of Pediatrics  
Pediatrician-in-Chief, Chief Medical Information Officer  
Seattle Children's Hospital, Seattle WA  
Policy Committee Chair, Council on Clinical Information Technology  
American Academy of Pediatrics

**Larry W Desch, MD FAAP**

Clinical Associate Professor  
Department of Pediatrics  
University of Illinois-Chicago School of Medicine, Chicago IL  
Developmental Pediatrician  
Advocate Health Care, Oak Lawn, IL

**Don E. Detmer, MD, MA**

President and Chief Executive Officer  
American Medical Informatics Association, Bethesda, MD

**Willa H. Drummond, MD MS (Informatics)**

Professor of Pediatrics, Physiology, and Large Animal Clinical Sciences  
Division on Neonatology  
University of Florida Colleges of Medicine & Veterinary Medicine,  
Gainesville FL  
Member, Executive Committee of the Council on Clinical Information  
Technology  
American Academy of Pediatrics

**Mitchell J. Feldman, MD FAAP**

Assistant Clinical Professor of Pediatrics  
Harvard Medical School  
Assistant in Computer Science, Department of Medicine and in Pediatrics  
Massachusetts General Hospital, Boston MA

**Jeffrey M. Ferranti, MD MS**

Associate Chief Information Officer  
Enterprise Analytics and Patient Safety  
Duke University Health System, Durham NC

**Catherine Garger, RN BSN**

Nursing Project Analyst  
The Johns Hopkins Children's Center, Baltimore, MD

**Robert S. Gerstle, MD FAAP**

Assistant Professor of Pediatrics  
Tufts University School of Medicine, Boston MA  
Pediatric Faculty, Division of Academic General Pediatrics  
Baystate Medical Center, Springfield MA

**Peter S. Greene, MD**

Executive Director  
MedBiquitous Consortium, Baltimore MD  
Chief Medical Information Officer  
The Johns Hopkins Medical Institutions, Baltimore MD

**Peter R. Holbrook, MD FAAP**

Chief Medical Officer  
Children's National Medical Center  
Professor of Anesthesiology and Critical Care Medicine  
George Washington University School of Medicine, Washington DC

**Howard E. Jeffries, MD FAAP**

Clinical Associate Professor of Pediatrics  
Medical Director, Continuous Performance Improvement  
Seattle Children's Hospital, Seattle WA

**Kevin B. Johnson, MD MS FAAP**

Associate Professor & Vice Chair of Biomedical Informatics  
Associate Professor of Pediatrics  
Vanderbilt University School of Medicine, Nashville TN

**George R. Kim, MD FAAP**

Research Associate in Pediatrics and Health Sciences Informatics  
The Johns Hopkins School of Medicine, Baltimore, Maryland  
Member, Executive Committee of the Council on Clinical Information  
Technology  
American Academy of Pediatrics

**Joy Kuhl**

Director, Health Information Technology  
Alliance for Pediatric Quality  
(American Academy of Pediatrics, American Board of Pediatrics,  
Child Health Corporation of America and the  
National Association of Childrens Hospitals and Related Institutions)  
Administrative Co Chair, HL7 Child Health Work Group  
Member, CCHIT Child Health Work Group

**Paul A. Law, MD MPH FAAP**

Director, Medical Informatics  
Kennedy Krieger Institute  
Assistant Professor of Pediatrics  
The Johns Hopkins School of Medicine, Baltimore MD

**Christoph U. Lehmann, MD FAAP**

Director of Clinical Information Technology

The Johns Hopkins Children's Center

Associate Professor of Pediatrics and Health Sciences Informatics

The Johns Hopkins School of Medicine, Baltimore MD

Member, Board of Directors, American Medical Informatics Association

**Harold P. Lehmann, MD PhD FAAP**

Associate Professor of Pediatrics and Health Sciences Informatics

The Johns Hopkins University School of Medicine, Baltimore MD

**Michael G. Leu, MD MS MHS FAAP**

Medical Director, Clinical Effectiveness

Pediatric Hospitalist/Informatician

Seattle Children's Hospital, Seattle WA

Applications Committee Chair, Council on Clinical Information Technology

American Academy of Pediatrics

**Donald E. Lighter, MD MBA FAAP FACHE**

Director, The Institute for Healthcare Quality Research and Education

Knoxville TN

Professor, College of Business Administration

University of Tennessee, Knoxville TN

**Paul H. Lipkin, MD FAAP**

Associate Professor of Pediatrics

The Kennedy Krieger Institute

The Johns Hopkins Children's Center, Baltimore, MD

**Carol Matlin, RN MS**

Pediatric Nurse Educator

The Johns Hopkins Children's Center, Baltimore MD

**Anne Matlow, MD FRCPC**

Professor of Pediatrics, Laboratory Medicine and Pathobiology

University of Toronto, Toronto ON Canada

Director of the Infection Prevention & Control Programme

Medical Director, Patient Safety

Sick Kids Hospital, Toronto ON Canada

**Robert E. Miller, MD**

Associate Professor of Pathology, Biomedical Engineering and Health Sciences Informatics

Director of Pathology Informatics

Johns Hopkins University School of Medicine, Baltimore MD

**Sandra H. Mitchell, RPh MSIS**

Senior Consultant

maxIT Healthcare, Westfield IN

**Declan O’Riordan, DO FAAP**

Pediatrician, Neonatal-Perinatal Medicine  
St Luke’s Children’s Hospital, Boise ID

**David Mark N. Paperny, MD FSAM FAAP**

Adolescent Medicine Specialist  
Kaiser Permanente Hawaii, Honolulu HI

**Ari H Pollack, MD FAAP**

Clinical Instructor of Pediatrics  
University of Washington School of Medicine  
Informatics Physician  
Seattle Children’s Hospital, Seattle WA

**Peter J. Porcelli Jr., MD MS FAAP**

Associate Professor of Pediatrics  
Wake Forest University School of Medicine, Winston-Salem, NC

**Molly Reyna, BA**

Senior Program Manager  
Pediatric Telemedicine Program  
Children’s National Medical Center, Washington, DC

**Samuel Trent Rosenbloom, MD MPH FAAP**

Assistant Professor, Departments of Biomedical Informatics, Internal Medicine  
and Pediatrics  
Assistant Professor, School of Nursing  
Vanderbilt University School of Medicine, Nashville TN

**Craig Sable, MD FAAP FACC**

Director, Echocardiography and Pediatric Cardiology Fellowship Training  
Medical Director, Telemedicine  
Children’s National Medical Center  
Associate Professor of Pediatrics  
George Washington University School of Medicine, Washington DC

**Joseph H. Schneider, MD MBA FAAP**

Chief Medical Information Officer & Medical Director of Clinical Informatics  
Baylor Health Care System, Dallas TX  
Chair, Council on Clinical Information Technology  
American Academy of Pediatrics

**Richard N. Shiffman, MD MCIS FAAP**

Professor of Pediatrics  
Yale Center for Medical Informatics  
Yale University, New Haven CT

**Mark M. Simonian, MD FAAP**

General solo pediatrician, Clovis CA  
Immediate past chair, Council on Clinical Information Technology  
American Academy of Pediatrics

**Anthony D. Slonim, MD DrPH**

Vice President of Medical Affairs  
Carilion Medical Center, Roanoke, Virginia  
Professor of Internal Medicine, Pediatrics and Public Health  
University of Virginia School of Medicine, Charlottesville VA

**Valerie Smothers, MA**

Deputy Director  
MedBiquitous Consortium, Baltimore MD

**David C. Stockwell, MD FAAP**

Medical Director of Patient Safety  
Assistant Professor of Pediatrics  
Children's National Medical Center, Washington DC

**Allen Y. Tien, MD**

Adjunct Associate Professor of Health Sciences Informatics  
The Johns Hopkins University School of Medicine, Baltimore MD  
Founder, President and Research Director  
Medical Decision Logic Inc, Baltimore MD

**Toby Vandemark, BA**

Consultant in Information Technology, Winter Park FL

**Michael A. Veltri, PharmD**

Director, Pediatric Pharmacy  
The Johns Hopkins Children's Center, Baltimore MD

**Carl G. M. Weigle, MD FAAP**

Professor of Pediatrics, Medical College of Wisconsin  
Chief Medical Information Officer, Children's Hospital of Wisconsin  
Member, Children's Specialty Group  
Children's Hospital of Wisconsin, Milwaukee WI

**Stuart T. Weinberg, MD FAAP**

Assistant Professor of Biomedical Informatics and Pediatrics  
Vanderbilt University School of Medicine, Nashville TN

**Alan E. Zuckerman, MD FAAP**

Assistant Professor of Family Medicine  
Director of Primary Care Informatics  
Georgetown University, Washington DC  
Member, Executive Committee of the Council on Clinical Information  
Technology  
American Academy of Pediatrics